SSME STRUCTURAL DYNAMIC MODEL DEVELOPMENT

Final Report

March 1989

Contract NAS8-37302

Prepared for

National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

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FOREWORD

Considerable interest has been focused recently on the performance and service life of the Space Shuttle Main Engine (SSME) powerhead in general, and the high pressure turbopumps in particular. This interest is evident in the extensive amount of analysis and testing performed by the NASA's Systems Dynamics Laboratory and their contractors throughout the SSME program. Work is continuing on the SSME turbomachinery to better understand performance characteristics and to improve reliability and ensure safe flight.

This report summarizes the results of work performed under NASA Contract NAS8-37302, "SSME Structural Dynamic Model Development," in which the solutions obtained from analytical models of the fuel turbopump impellers are compared with the results obtained from dynamic tests. This work supports the SSME Development Engineering effort, Block I, Phases 2 and 3, for the engine upgrade task. The work described in this report was performed for the George C. Marshall Space Flight Center by the Structures and Mechanics Group at Lockheed's Huntsville Engineering Center. The contracting officer's technical representative for this effort is Mr. Larry A. Kiefling, Science and Engineering Directorate, Structures and Dynamics Laboratory (ED22).

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1. INTRODUCTION

The high pressure fuel turbopump (HPFTP), shown in Rocketdyne drawing no. RS007501-1091, is a major component of the Space Shuttle Main Engine (SSME) powerhead. The device is a three stage centrifugal pump that is directly driven by a two stage hot gas turbine. The purpose of the pump is to deliver fuel (liquid hydrogen) from the low pressure fuel turbopump (LPFTP) through the main fuel valve (MFV) to the thrust chamber coolant circuits. In doing so, the pump pressurizes the fuel from an inlet pressure of approximately 178 psi to a discharge pressure of over 6000 psi. At full power level (FPL), the pump rotates at a speed of over 37,000 rpm while generating approximately 77,000 horsepower. Obviously, a pump failure at these speeds and power levels could jeopardize the mission.

A previous ground test of an SSME resulted in termination of the firing due to abnormal synchronous vibration of the fuel pump. Further investigation revealed that a high cycle fatigue crack had formed in the shroud of the first stage impeller. This failure occurred in 1984 on test 750-245 on SSME No. 2308, HPFTP No. 2608R2, impeller serial no. 7315319, and is described in ref. 1. The location of the crack is shown in Figure 1. As a result of this failure and other impeller problems, considerable engineering effort has focused on the analysis and testing of this component.

2. IMPELLER FINITE ELEMENT MODELS

Since the occurrence of a crack in an HPFTP first stage impeller in 1984, several different mathematical models have been built to investigate the behavior of the component. These finite element models were constructed by NASA and their contractors using several different commercially available finite element codes. The geometry for each of the three impellers is similar. Rocketdyne drawing no. R0019226-015 describes the first stage impeller geometry, RS007555-017 the second stage, and RS007556-017 the third stage. This report summarizes the efforts to analytically identify the vibration characteristics of the impeller.

2.1 Lockheed NASTRAN Model

Under NASA Contract No. NAS8-34978, Lockheed-Huntsville built a NASTRAN solid element model of the first stage fuel pump impeller which was documented in ref. 2. This work was done in support of the failure investigation on pump 2608R2 on test 750-245. A 60-degree segment of the impeller was modeled following the sweep of the region between full blades as shown in Figure 2. Figure 3 shows a computer generated plot of the NASTRAN model, and Figure 4 illustrates how each segment interfaces to form the complete 360-degree geometry.

The frequencies shown in Table 1 were computed from the NASTRAN cyclic symmetry analysis. It should be noted that in this analysis no modes were computed for the k=3 harmonic. A Campbell diagram, shown in Figure 5, was also generated for the impeller.

2.2 Rockwell STARDYNE Model

Rockwell's study of the SSME first stage impeller included a dynamic analysis using a STARDYNE finite element model and a modal test. This work supported the 2608R2 HPFTP failure investigation and is documented in ref. 3. The model includes the impeller hub, shroud, and vanes but does not include the shaft. The shaft was assumed to be infinitely stiff and fixed to ground. Both the shroud and the vanes were modeled with plate elements, and the hub was modeled with solid bricks. The labyrinth teeth were included in the model as beam elements. A total of 2493 nodes were required to define the geometry, and these nodes were interconnected by nearly 4000 finite elements. The modeling technique used to connect the plate elements to the solids was a row of bending plates on the hub which do not resist membrane forces.

Several computer-generated plots of the model show the detail used for defining the geometry for the full 360-degree model. Figure 6 shows the impeller shroud, Figure 7 shows the vanes, and Figure 8 shows the hub elements. The computed frequencies up to 30 kHz are given in Table 2, with a description of the corresponding mode shape.

2.3 NASA/MSFC EAL Model

Of particular interest to the current study is a 60-degree segment model built by Larry A. Kiefling of NASA/MSFC and documented in ref. 4. This model was constructed using the EAL finite element program (ref. 5) and is unique in that it exploits two features of the EAL code simultaneously. Both the macroelement procedures (ref. 6) and the cyclic symmetry procedures (ref. 7) are used to effect a solution with the minimum possible model size (60-degree) while still providing sufficient detail in the area where the crack occurred. A detailed substructure or macroelement is used to recover dynamic stresses in the outer rim of the shroud.

Computer-generated plots included in the analysis are shown in Figures 9 through 12. Figure 9 shows a plot of the impeller shroud with the four macroelements removed. Figure 10 shows the vanes, Figure 11 shows the hub, and Figure 12 shows the macroelement. Table 3 lists the computed frequencies to 30 kHz. The additional prestress due to spin stiffening are included in the calculations.

2.4 Lockheed DIAL Model

Under NASA Contract No. NAS8-37282, Lockheed built a detailed solid element mathematical model of the third stage fuel pump impeller which is fully documented in ref. 8. Figure 13 shows a plot of the geometry for the 60-degree segment. The model contains 7068 node and 1168 parabolic solid elements, and has a total of 21,161 degrees of freedom. This model was built using the DIAL finite element code (ref. 9) and is the most refined model examined during this effort. No attempt was made, however, to model the fillets found where the vanes connect to the hub and shroud. Although some fairly high stresses were computed in these areas, it is doubtful that this simplification would significantly effect the computed frequencies.

A cyclic symmetry procedure was used in the analysis to generate the required boundary conditions for the model as described in ref. 10. This procedure allowed modes to be computed for the symmetric-symmetric, first degenerate, second degenerate, and antisymmetric-antisymmetric boundary conditions. Vibration frequencies up to 50 kHz were computed for a total of 463 modes. The mass modal participation factors were also computed for these modes and included in ref. 8. Table 4 lists the frequencies obtained from the analysis up to 30 kHz. A separate computer run was made to determine the spin stiffening effect of the impeller at FPL speed. It was determined that the natural frequencies were increased by 5% or less. The modal density above 30 kHz, however, does start to drop considerably for the model, and the accuracy above this frequency range may not be as good.

2.5 Lockheed EAL Model

Lockheed built an EAL finite element model of the impeller composed entirely of solid elements. A listing of this model is provided as Appendix A. The model is a modified version of the Lockheed DIAL model described above. The model was constructed by first deleting all the edge nodes on the parabolic elements so that only eight nodes per brick element and six nodes per wedge element remained. This reduced the number of joints in the model to 1981. A one-to-one element mapping was performed next. The model is comprised of 1150 S81 elements and 18 S61 elements, which is consistent with the 1168 element total for the DIAL model.

Extensive geometry checks were performed on the model using SDRC Supertab on a SUN workstation. Figure 14 shows an isometric view of the model, and Figures 15 through 17 show views looking down the three coordinate axes. A special DALPRO runstream was written to convert the model from an SDRC Universal File format directly into an EAL316 data deck. This runstream is included as Appendix B. The geometry processor (E) in EAL reported excessively warped four node surfaces, however, and the test value (parameter 4) had to be increased five orders of magnitude to sucessfully pass through the element geometry checks. For this reason, no frequencies are reported.

3. IMPELLER TEST RESULTS

Numerous tests have been conducted to investigate the dynamic response of the SSME HPFTP impellers. These tests are designed to extract the modal parameters of the structure. This section discusses three tests conducted by Rocketdyne in response to the failure of an SSME HPFTP during previous testing.

3.1 Rocketdyne Modal Rap Test

The first test was a modal test conducted by Rocketdyne on the HPFTP first stage impeller (ref. 11). An impeller was instrumented with strain gages concentrated near the shroud area for each outlet vane. A high cycle fatigue crack had formed in this area in a previous test article. Transient excitation was supplied by a calibrated hammer, and frequency response functions of acceleration were taken in the axial direction. Frequency response functions of strain were also measured by exciting the impeller axially and measuring the circumferential strain. The impeller tested was not mated with the rotating assembly. The rotating assembly consist of three impellers and two turbine disks. Data was collected for frequencies to 16000 Hz, but only modes to 12000 Hz were curve fit. The 7000 and 10643 Hz modes were insufficient to extract the corresponding acceleration mode shapes. Also, the 11255, 11267 and 11301 Hz mode shapes may be suspect because of the close spacing and difficulty in extracting these modes. Table 5 lists the modal data for this test.

3.2 Rocketdyne Holographic Modal Test

The next test examined was a holographic interferometry test conducted at the low power laser facility at Rocketdyne (ref. 3). The impeller was fixed in a cantilevered position, and excitation was achieved in the form of a high frequency crystal shaker. Holograms were taken of the front shroud. Using a mirror, a portion of the impeller back could also be viewed. The impeller was excited at frequencies from 0 to 30,000 Hz by slowly driving through this frequency range and noting possible resonant behavior. An accelerometer located on the impeller rim was used to locate possible natural frequencies. Each resonant peak was then examined in more detail by maximizing the interference of the laser light sources at the previously found suspect frequency. The holographic modal test depicts axial displacements of the impeller by lines of constant displacement represented by fringe patterns. Greater displacements result in more fringe lines. The spacing between fringe lines is equal to the wavelength of the laser light. For this test, a red krypton ion laser with a wavelength of 25.48 microinches was used.

The test results show that modal deflections were observed in five distinct areas of the impeller: the rim, mid-shroud, front laby teeth, back laby teeth, and inlet edges of

primary vanes. The testing focused on the rim-based deflections because these modal deflections would most likely result in a crack originating at the impeller rim as seen in the test article. The rim modal deflections were categorized as diametral modes, modulated modes, or flap modes. Table 5 lists the modal frequencies found during this test.

3.3 Rocketdyne Vibration Test

The last test conducted by Rocketdyne was of the second stage impeller (ref. 12). The initial test consisted of an impeller mounted by standard methods on a shaker to simulate the actual hardware. The shaker had a 2-g sinusoidal output from 0 to 10,000 Hz. This test revealed the frequencies for the 2-g input, although mode shapes were inconclusive.

A decision was made to use holographic test methods because of inadequate mode shapes from the previous test. Two setups were tested by this method: one with the impeller suspended as a free-free disc and the other center supported to simulate the actual turbopump environment. As expected, these two setups resulted in variations in frequencies and mode shapes. The results from these three tests are listed in Table 6.

3.4 Polaroid Photographs

A set of Polaroid photographs provided by Mr. Kiefling are included as Figure 18. These photos show the first stage impeller resonance frequencies for 22,197 Hz through 30,393 Hz. These data, along with the data described in the previous sections, comprise all the test data available to the authors at the time of this report.

4. CONCLUSIONS AND RECOMMENDATIONS

This report summarizes the extensive analysis and testing of the HPFTP impeller performed as a result of the hardware failure on SSME 2308. Analytical models of the HPFTP impeller show resonant vibration frequencies within the operating range of the pump. Testing of the impeller verifies these results.

One recommendation resulting from this study is the construction of a new impeller model with minimum effort. The Lockheed EAL solid element model described in Section 2.5 of this report could be refined to alleviate the warped surfaces and provide the high level of detail required for accurate strength analysis. This could be done by first including some of the edge nodes that were deleted from the original Lockheed DIAL model described in Section 2.4. Each parabolic solid brick element could then be converted to two EAL S81 elements. This would produce a model with approximately 2300 elements, which could easily be run on the NASA-MSFC EADS computer.

5. REFERENCES

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10. J. Dickens, "The Application of Cyclic Symmetry for Economic Solutions of Static and Dynamic Finite Element Models," Rocketdyne Internal Memo.

11. C.J. Wellstein, "HPFTP 1st Stage Impeller and Rotating Assembly Modal Tests," Rocketdyne Internal Letter (5128-0036), 20 February 1985.

12. D.M. Chenault, "HPFTP Second Stage Impeller Vibration Test Report," Rocketdyne Test Report (unpublished).

Table 1 **LOCKHEED NASTRAN MODEL COMPUTED FREQUENCIES**

Harmonic Index	Mode Number	Frequency (Hz)
K=0	1	1596
	2	2857
	3	7040
	4	11005
K=1	1-2	1529
	3-4	3801
	5-6	5797
	7-8	8359
	9-10	9597
	11	9875
	12	14126
K=2	1-2	3271
	3-4	7375
	5-6	8766
	7	12906

Table 2 **ROCKWELL STARDYNE MODEL COMPUTED FREQUENCIES**

Mode No.	Frequency (Hz)	Mode Shape
1	2235.5	1st Diametral
2	2235.5	1st Diametral
3	2465.2	1st Umbrella
4	2751.8	2nd Diametral
5	2751.8	2nd Diametral
6	2912.1	
7	4203.5	3rd Diametral
8	4451.0	3rd Diametral
9	5379.0	
10	5379.0	
11	6045.7	4th Diametral
12	6045.7	4th Diametral
13	7727.0	5th Diametral
14	7727.0	5th Diametral
15	7888.9	Complex 2D
16	7888.9	Complex 2D
17	8719.2	
18	9083.3	
19	9083.3	
20	9313.4	6th Diametral
21	9435.5	6th Diametral
22	9780.5	
23	9970.7	
24	10531.8	
25	10590.7	
26	10590.7	
27	10973.8	7th Diametral
28	10973.8	7th Diametral
29	11106.6	
30	11106.6	
31	11270.8	
32	11521.2	
33	11521.2	
34	11740.6	
35	11740.6	
36	12137.2	
37	12382.1	6 MOD 2
38	12382.1	6 MOD 2
39	12688.3	8th Diametral
40	12688.3	8th Diametral
41	12832.7	
42	13172.8	3 MOD 1
43	13172.8	3 MOD 1
44	13478.2	
45	14275.7	9th Diametral
46	14277.9	9th Diametral
47	14292.5	
48	14292.5	
49	14485.9	
50	14610.3	

(Continued)

Table 2 **ROCKWELL STARDYNE MODEL COMPUTED FREQUENCIES**

Mode No.	Frequency (Hz)	Mode Shape
51	14610.3	
52	14886.3	3 MOD 1 Pattern
53	14886.3	3 MOD 1 Pattern
54	15367.4	
55	15470.3	Complex 2D
56	15470.3	Complex 2D
57	15567.2	
58	15758.5	
59	15758.5	
60	15857.9	10th Diametral
61	15857.9	10th Diametral
62	16045.1	
63	16184.3	
64	16446.9	
65	16521.1	
66	16521.1	
67	16710.9	
68	16710.9	
69	17183.3	11th Diametral
70	17183.3	11th Diametral
71	17357.0	
72	17457.5	
73	17551.9	
74	17551.9	
75	17609.9	
76	17674.4	
77	17674.4	
78	17732.0	12th Diametral
79	17867.9	
80	17896.1	
81	17896.1	
82	18072.9	
83	18398.6	
84	18577.7	
85	18643.4	
86	18643.4	
87	19018.8	
88	19018.8	
89	19236.3	
90	19236.4	
91	19475.2	
92	19544.9	12 MOD 1
93	19545.3	12 MOD 1
94	19567.9	12 MOD 2
95	19568.2	12 MOD 2
96	19634.1	
97	19665.3	12th Diametral
98	19759.8	12 MOD 3
99	19786.0	12 MOD 3
100	19897.9	

(Continued)

Table 2 **ROCKWELL STARDYNE MODEL COMPUTED FREQUENCIES**

Mode No.	Frequency (Hz)	Mode Shape
101	19898.0	
102	19954.7	12 MOD 4
103	19954.9	12 MOD 4
104	20032.3	
105	20142.1	
106	20272.5	
107	20272.5	
108	20391.5	
109	20751.1	
110	20751.3	
111	20754.9	
112	20754.9	
113	20802.4	
114	20845.1	
115	20845.2	
116	20926.1	
117	21195.7	
118	21239.3	
119	21239.6	
120	21342.6	12 MOD 6
.		
.		
.		
142	24228.5	13th Diametral
143	24228.5	13th Diametral
.		
.		
.		
157	25423.7	14th Diametral
158	25423.7	14th Diametral
.		
.		
.		
207	29463.2	15th Diametral
208	29671.2	15th Diametral

Table 3 NASA-MSFC EAL MODEL COMPUTED FREQUENCIES

Mode No.	Harmonic 0	Harmonic 1	Harmonic 2	Harmonic 3
1	170	433	2621	4362
2	1892	860	6205	4523
3	4997	5576	7126	10007
4	8478	7754	9447	10196
5	9332	7886	12099	11934
6	9455	10566	12230	12392
7	11036	10837	12744	13433
8	12941	12795	13185	13545
9	13286	15433	14588	15077
10	15888	15535	14705	15684
11	16941	16002	15536	16677
12	17547	16632	16908	17658
13	18557	18283	18387	17678
14	19260	19133	18944	19328
15	19912	20241	20920	20541
16	20087	20831	21559	21248
17	21470	21246	22561	23265
18	21812	21957	22873	23540
19	21872	22199	22964	23804
20	21929	22309	23377	24336
21	23542	23989	23747	24992
22	23943	24503	24308	25432
23	24069	24767	24923	25516
24	24214	24932	25347	25577
25	24898	25389	26333	26131
26	25581	25583	27000	26799
27	25871	26371	27260	28017
28	26382	26656	28139	28271
29	26630	27605	28512	28386
30	27509	27980	28785	29138
31	28627	28599	29132	29653
32	29282	29152	29326	29890
33	29540	29592	29459	
34	29854	29813	29944	
35	29952			

Table 4 LOCKHEED DIAL MODEL COMPUTED FREQUENCIES

MODE NUMBER	SYM-SYM	1st DEGEN	2nd DEGEN	ANTI-ANTI
1	1823	2109	2682	3946
2	2249	4207	5390	4101
3	5076	6704	7635	9728
4	7894	7746	9755	9946
5	8093	9116	10519	10640
6	8832	9278	11037	11784
7	9932	10498	11920	11827
8	11834	11646	12083	12576
9	13953	13167	12993	12852
10	14220	13715	13376	14375
11	14453	13966	14957	14930
12	14870	15804	15395	16796
13	15549	17349	16340	16987
14	16447	17723	17880	17838
15	16983	17944	18686	18397
16	18092	18361	18777	18512
17	18377	18688	19240	18967
18	18966	19046	19747	19086
19	19982	19612	20485	20441
20	20119	19948	20701	21118
21	20229	20414	20938	21282
22	21074	20804	21108	21874
23	21386	21137	21565	22485
24	21441	21403	22014	23457
25	21771	22129	22546	23479
26	21850	22658	23063	24614
27	22123	22967	23566	24705
28	22460	23156	24017	24973
29	23537	23571	24611	25412
30	23852	24230	24779	25846
31	24154	24698	25125	26270
32	25214	24912	25531	26737
33	25885	26014	26049	26787
34	25971	26229	26532	27352
35	26163	26370	27513	27974
36	26461	26738	27952	28168
37	26999	27155	28010	28635
38	27822	27737	28347	28948
39	27865	28018	28833	29516
40	28066	28237	29172	
41	28567	28829	29448	
42	28656	29133	29657	
43	29614	29428	29862	
44	29799	29762		
45	29958	29995		

Note: All frequencies are in Hertz.

Table 5 **ROCKETDYNE THIRD STAGE IMPELLER TEST RESULTS**

ROCKETDYNE RAP TEST		ROCKETDYNE HOLOGRAPHIC TEST			
MODE NUMBER	FREQUENCY Hz	MODE	FREQUENCY Hz *	MODE	FREQUENCY Hz *
1	2389	2D	2576	14D	24046
2	3256	2D	2596	14D	- - - - -
3	3970	3D	4257	15D	NOT FOUND
4	4242	3D	4545	15D	NOT FOUND
5	5883	4D	6267	16D	NOT FOUND
6	7000	4D	6281	16D	NOT FOUND
7	7555	5D	8110	17D	28382
8	7580	5D	8135	17D	- - - - -
9	7714	6D	9687	12MOD1	16388
10	7743	6D	9987	12MOD1	16463
11	8645	7D	11359	12MOD2	NOT FOUND
12	9143	7D	11556	12MOD2	NOT FOUND
13	9363	8D	13089	12MOD3	20514
14	9424	8D	- - - - -	12MOD3	
15	9960	9D	14312	12MOD4	NOT FOUND
16	10312	9D	- - - - -	12MOD4	NOT FOUND
17	10643	10D	15500	12MOD6	21376
18	10766	10D	- - - - -	12MOD6	- - - - -
19	10786	11D	NOT FOUND		
20	11256	11D	NOT FOUND		
21	11269	12D	16897		
22	11302	12D	22824		
23	11940	13D	NOT FOUND		
24	11954	13D	NOT FOUND		

* All frequencies have been scaled to a temperature of -390 F. Frequencies were scaled by multiplying room temperature results by 1.05.

Table 6 **ROCKETDYNE SECOND STAGE IMPELLER TEST RESULTS**

MODE SHAPE	TEST TYPE/FREQUENCY (Hz)		
MODE(i,j) i=diameter j=circum.	SHAKER CLAMPED AS ACTUAL STACK *(1)	HOLOGRAPHY FREE-FREE SETUP	HOLOGRAPHY SUPPORTED BY PRELOAD *(2)
1,0 	1570	DOES NOT EXIST	1276
0,0 	NOT FOUND	DOES NOT EXIST	2139
2,0 	3300	2850	2837
0,1 	NOT DEFINITE	3880	NOT FOUND
3,0 	4800	4360/4550	4370
1,1 	5130/5240	5852	
2,1 		8182	8186/8202
4,0 	6672	6152	6153/7642
5,0 	7630	7642	6264/7642
6,0 	8330	8830/9740	8827/9075

*(1) Mode shapes assumed by comparing

*(2) Assumed simply supported

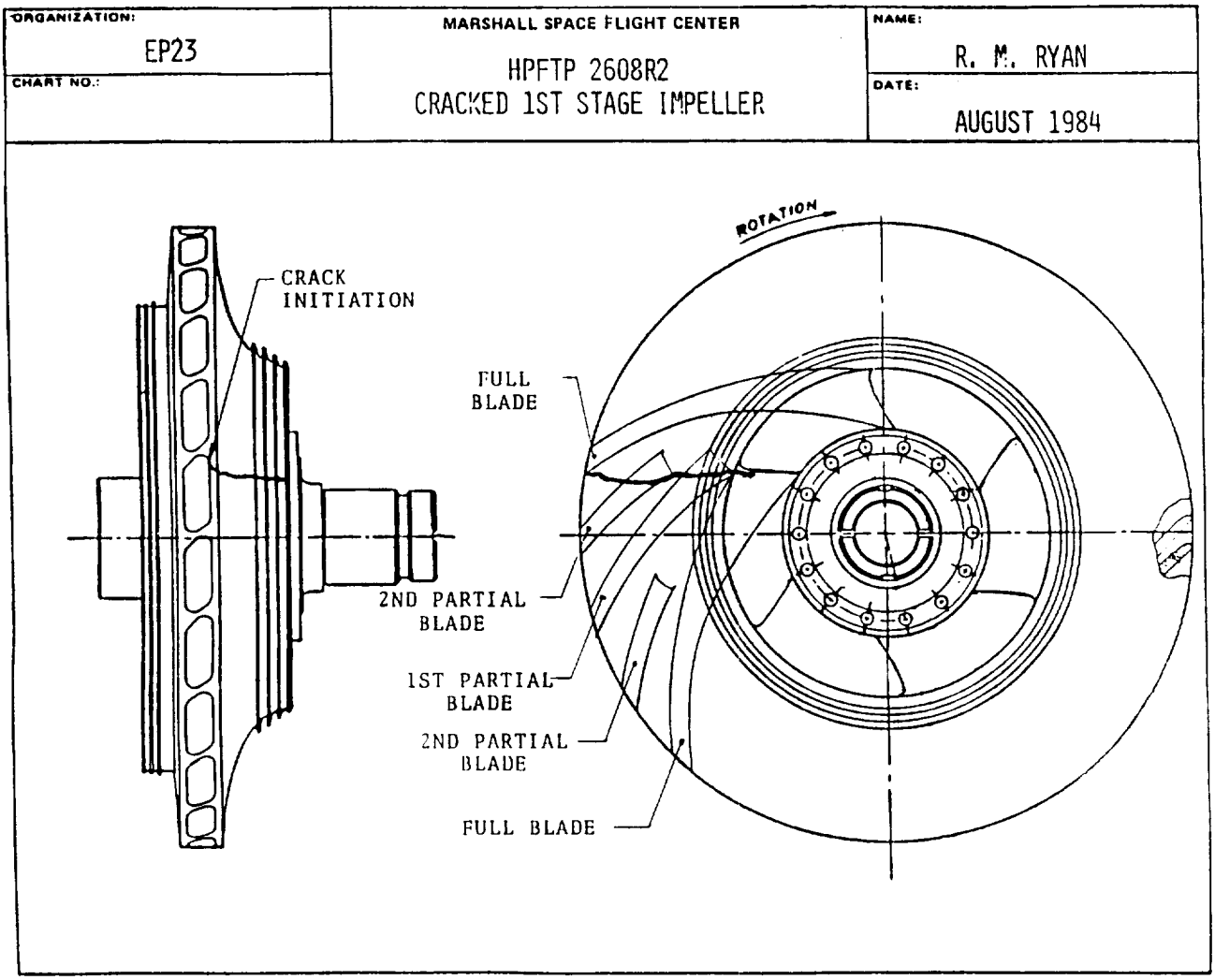


Figure 1 HPFTP 2608R2 Cracked First Stage Impeller

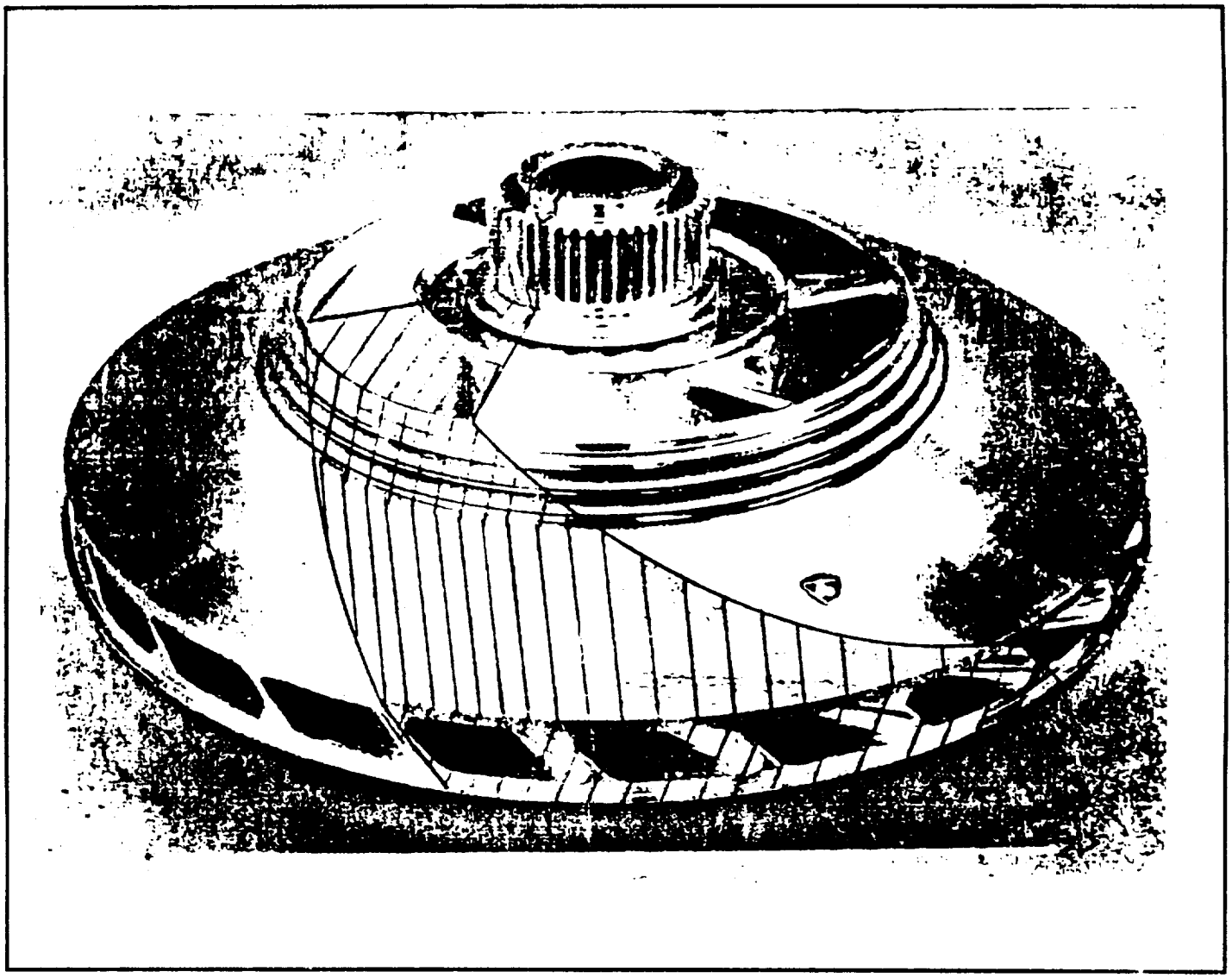


Figure 2 60-Degree HPFTP Impeller Segment Modeled with NASTRAN

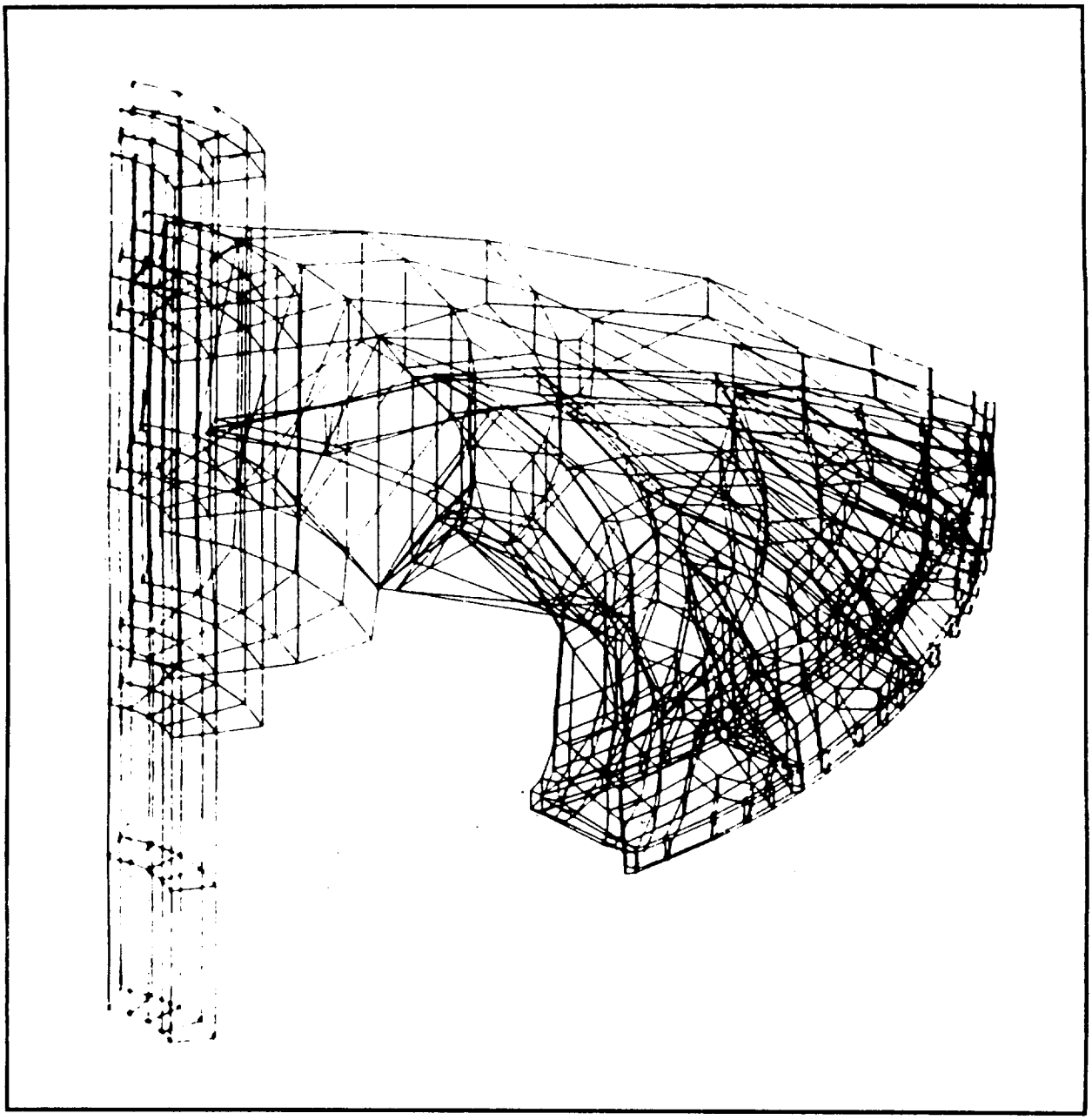


Figure 3 NASTRAN Finite Element Model of HPFTP Impeller

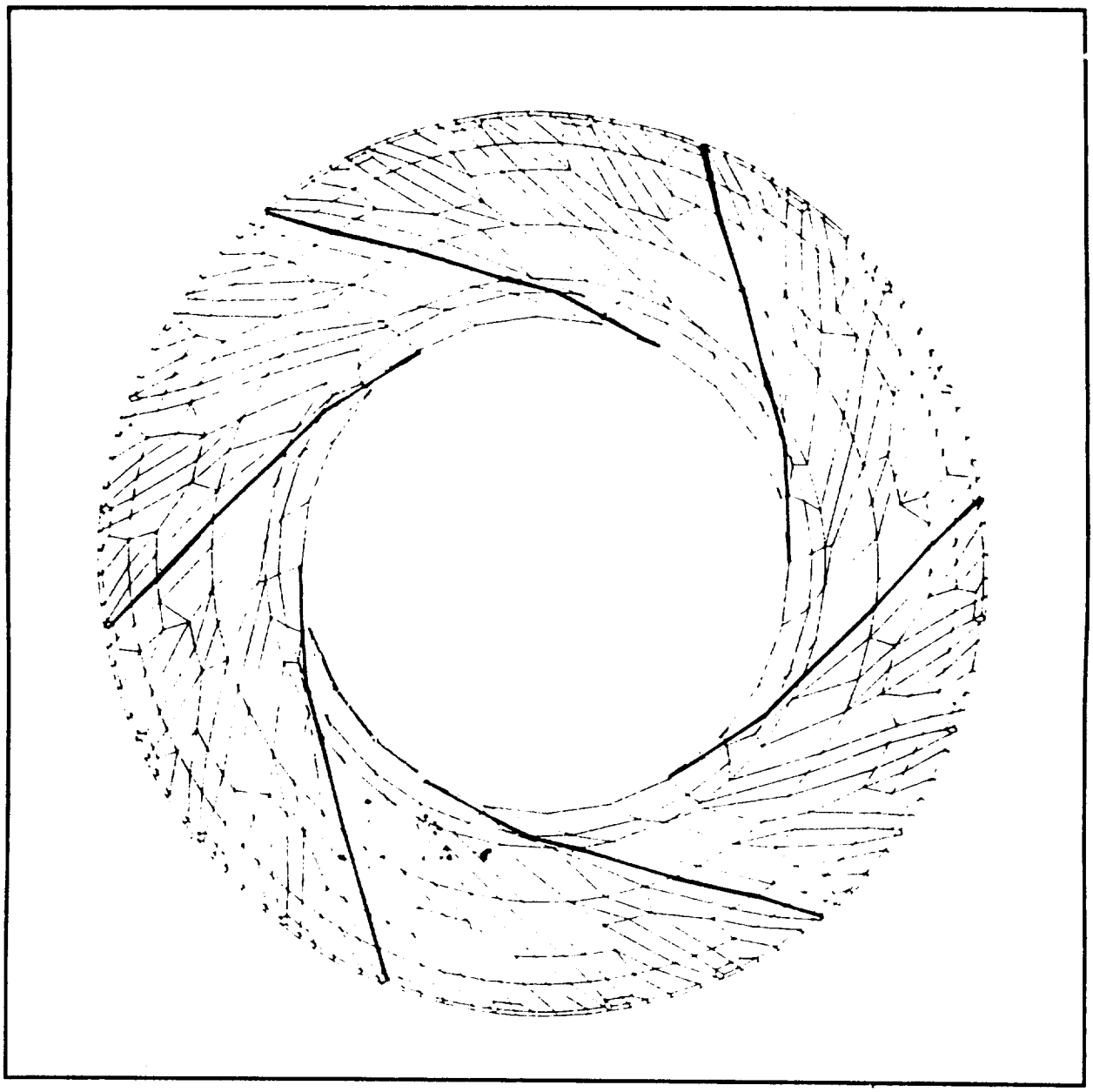


Figure 4 Schematic of HPFTP Impeller Model Assembly

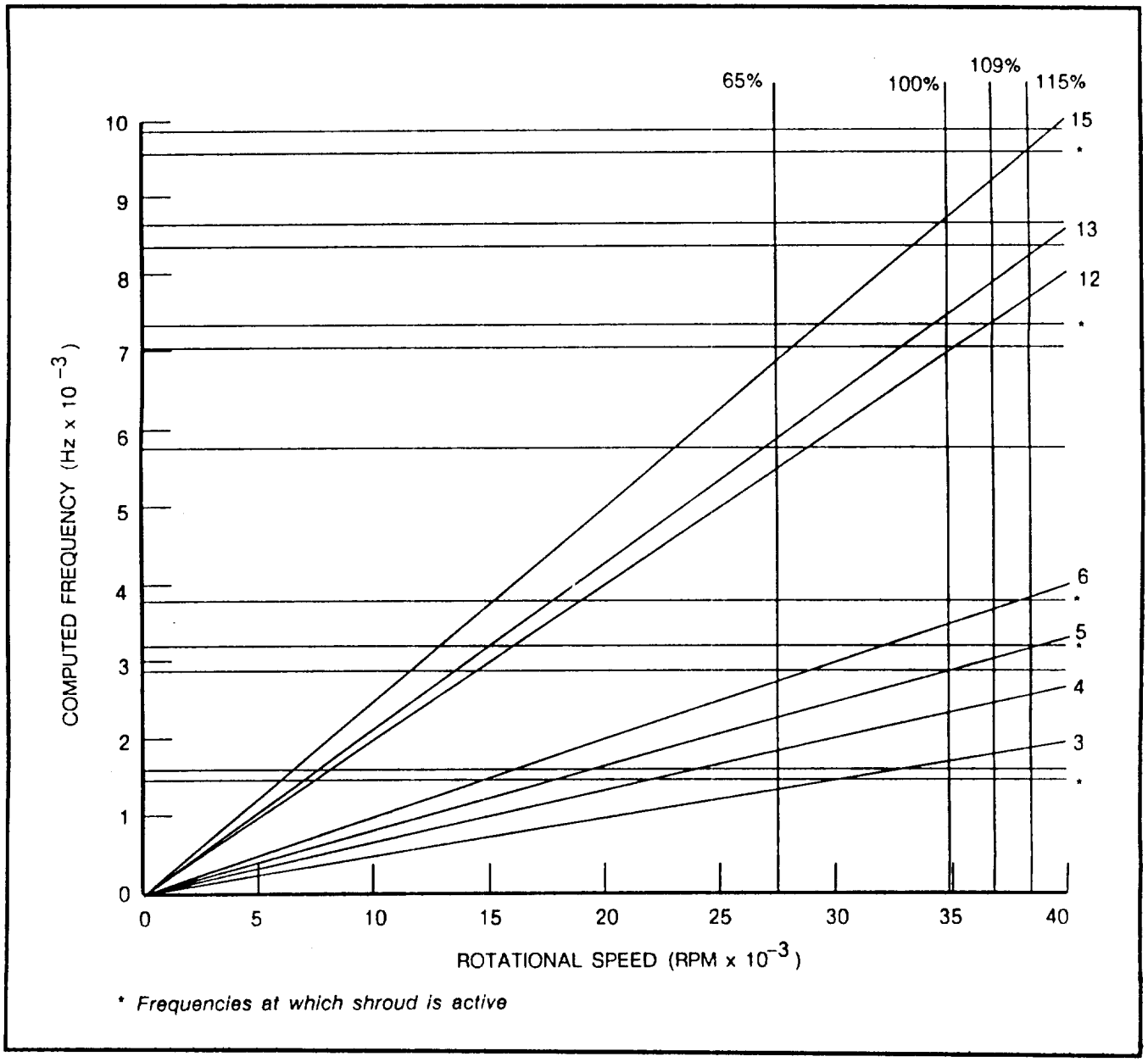


Figure 5 HPFTP Impeller Campbell Diagram

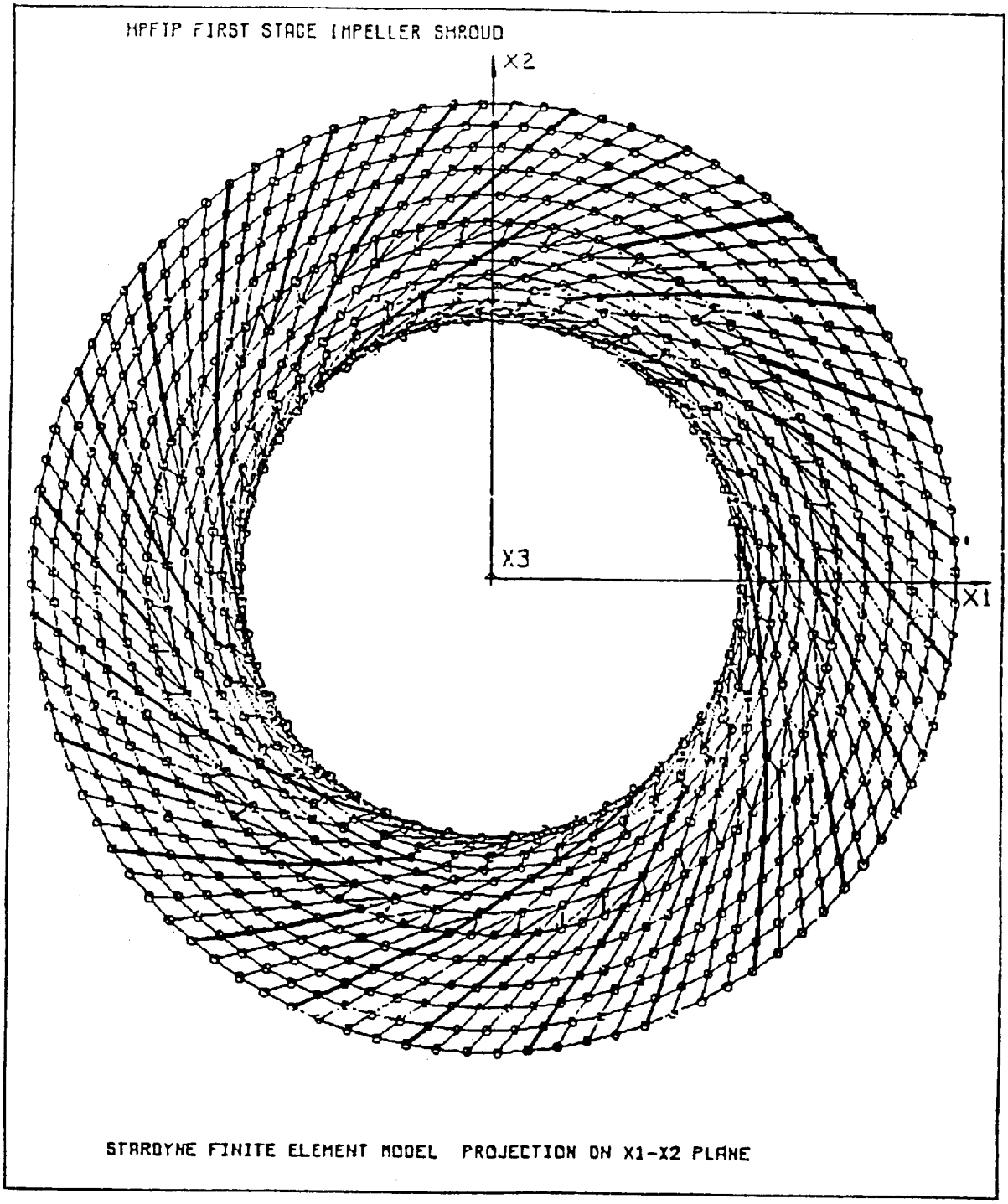


Figure 6 STARDYNE HPFTP Impeller Model – Plot of Shroud

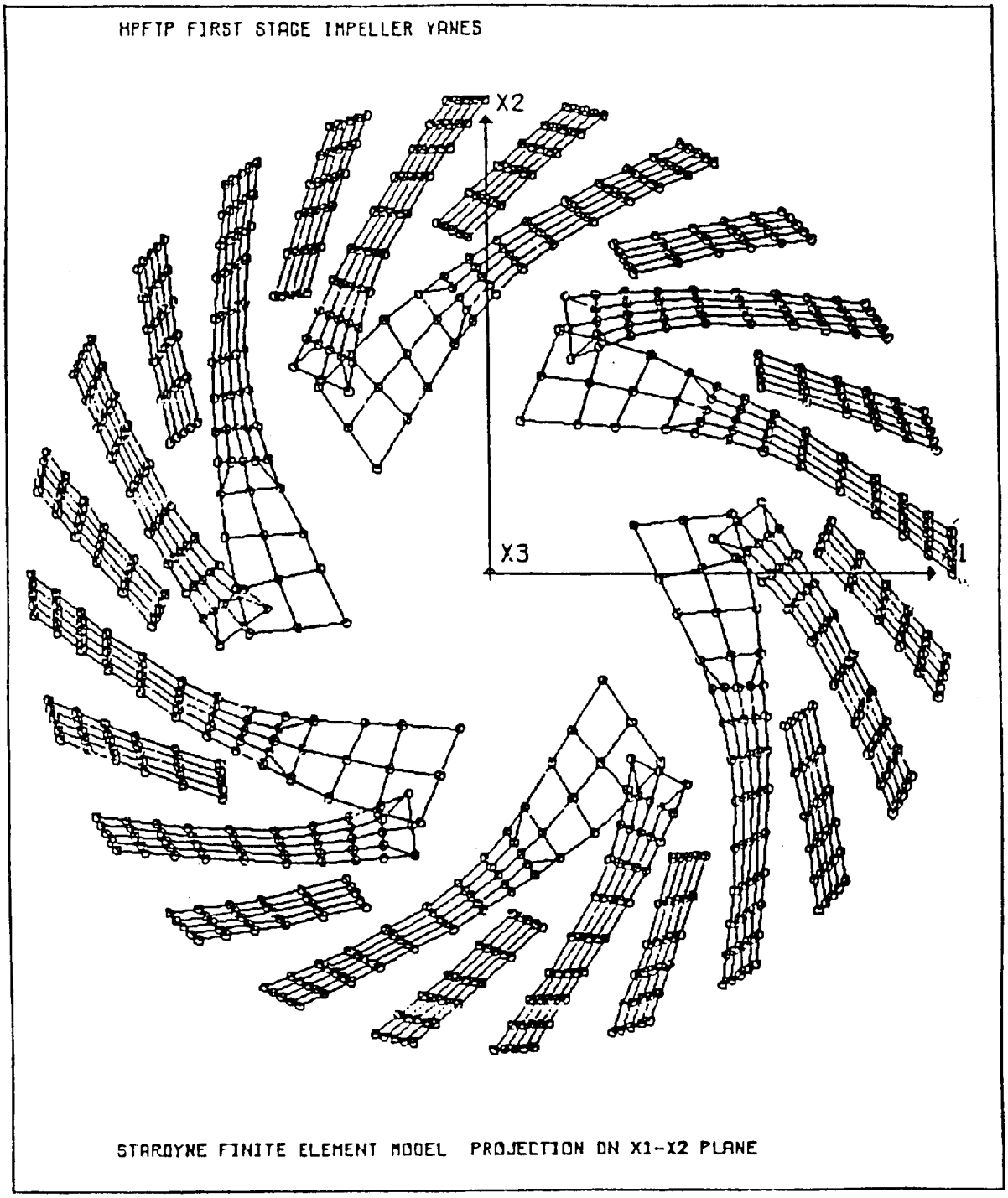


Figure 7 STARDYNE HPFTP Impeller Model – Plot of Vanes

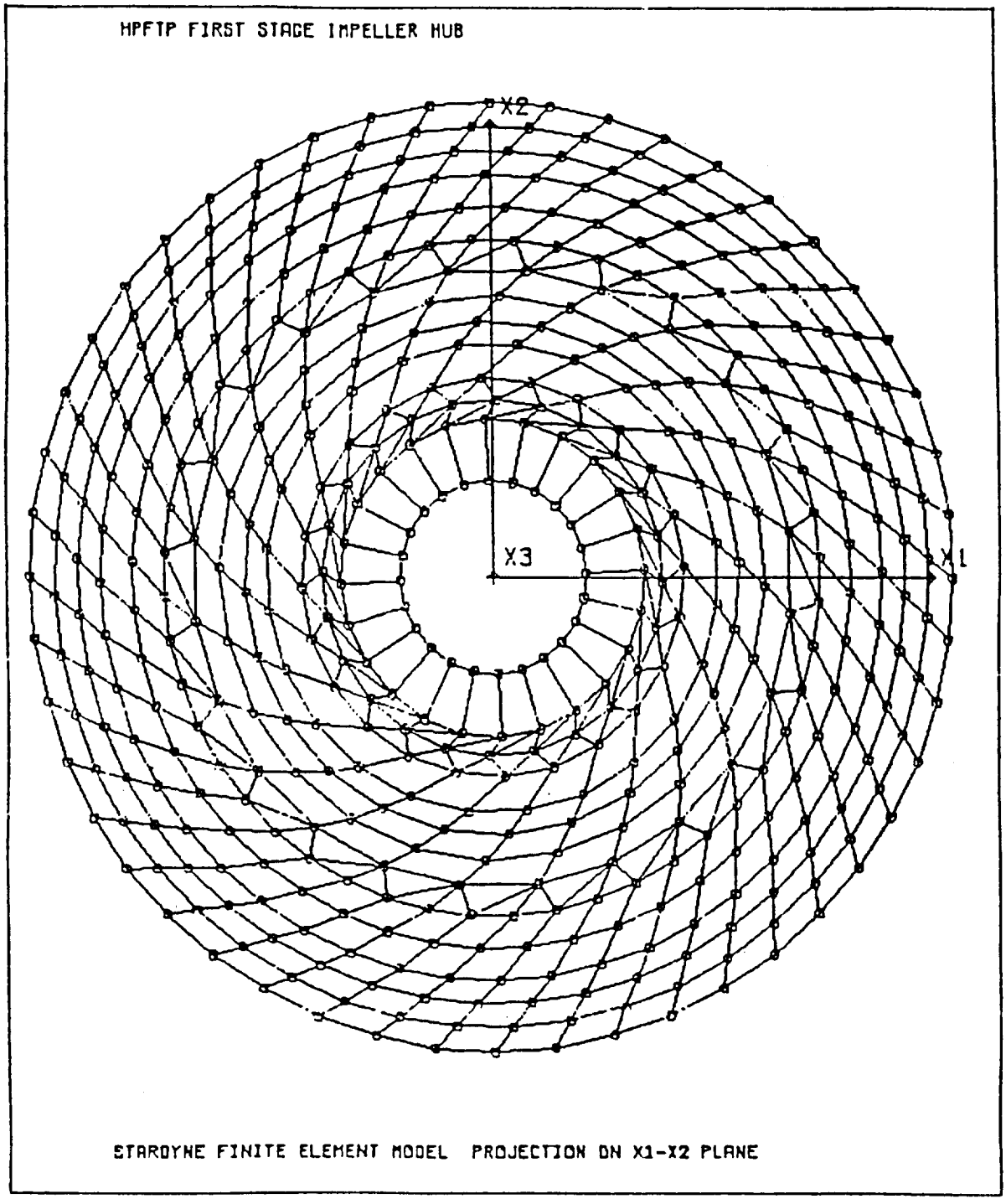


Figure 8 STARDYNE HPFTP Impeller Model – Plot of Hub

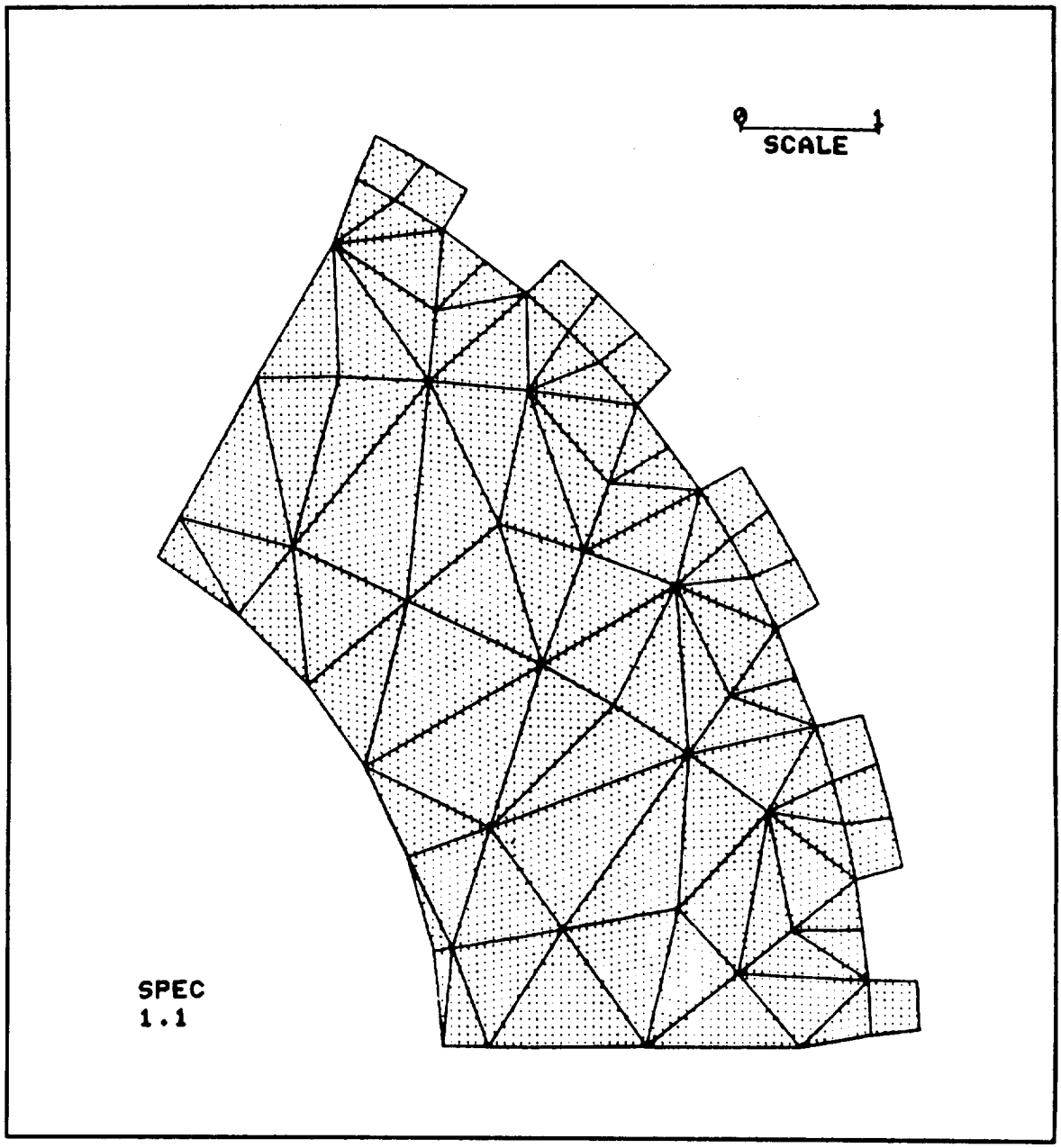


Figure 9 NASA-MSFC EAL HPFTP Impeller Model – Plot of Shroud

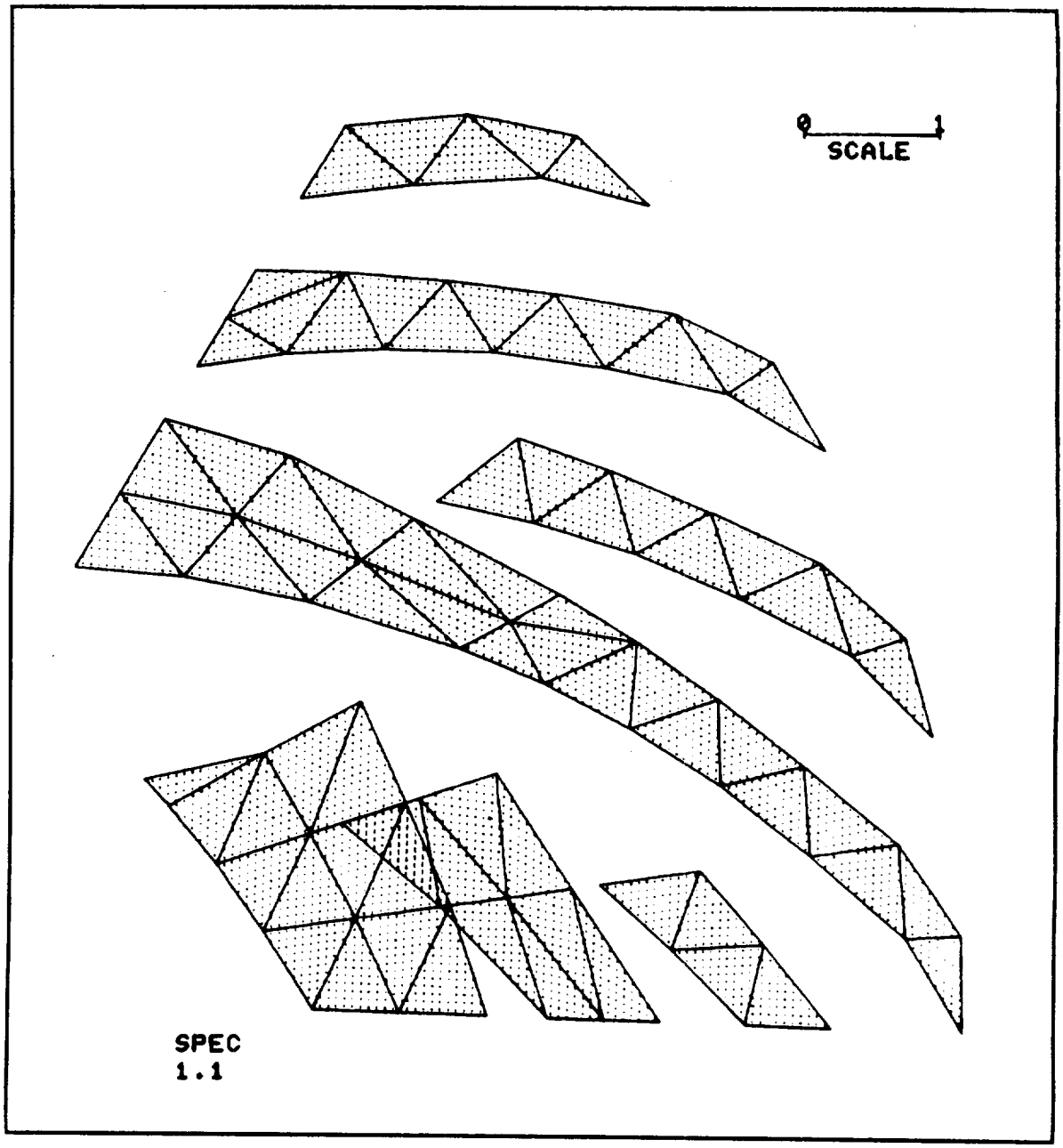


Figure 10 NASA–MSFC EAL HPFTP Impeller Model – Plot of Vanes

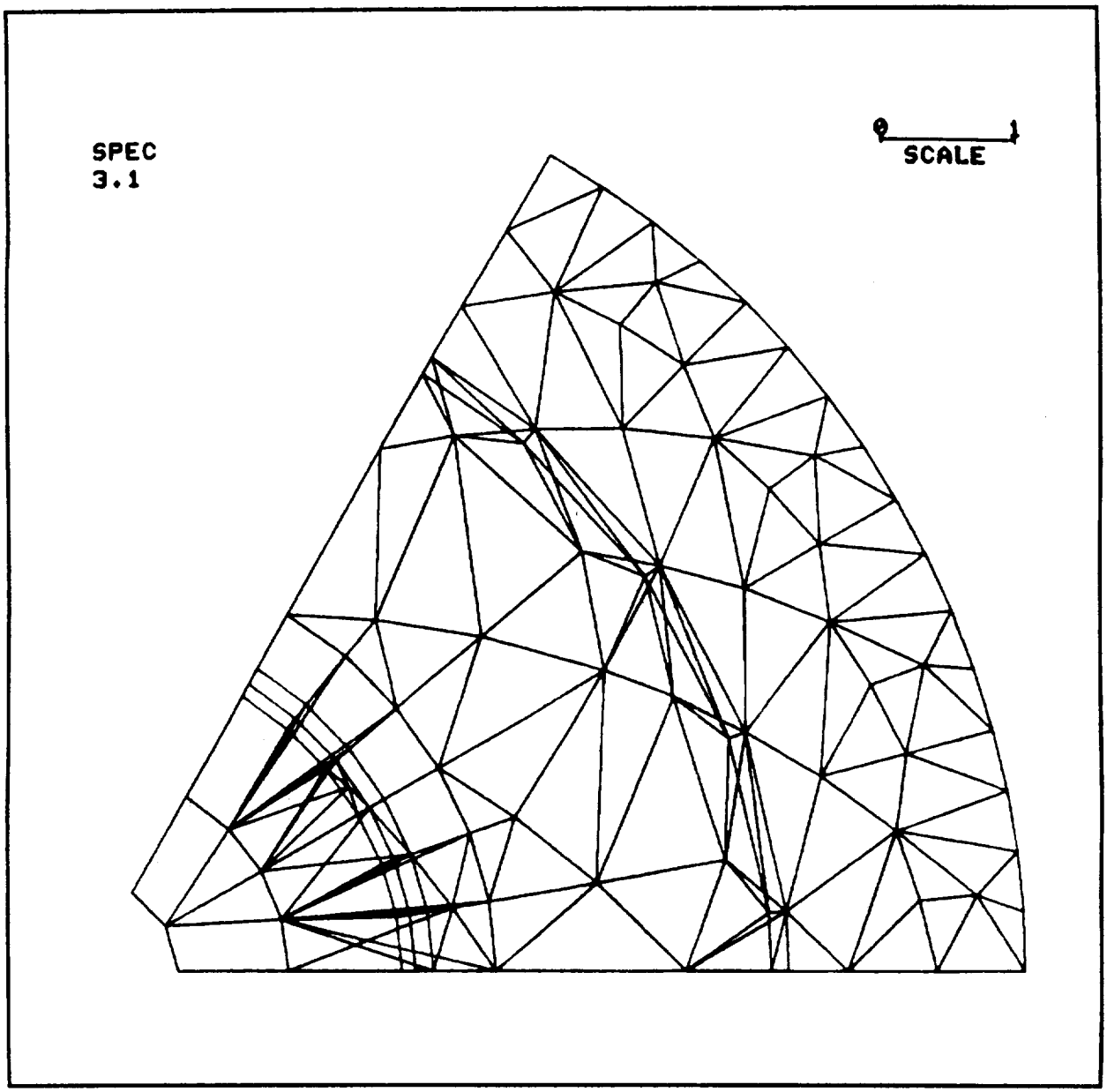


Figure 11 NASA-MSFC EAL HPFTP Impeller Model - Plot of Hub

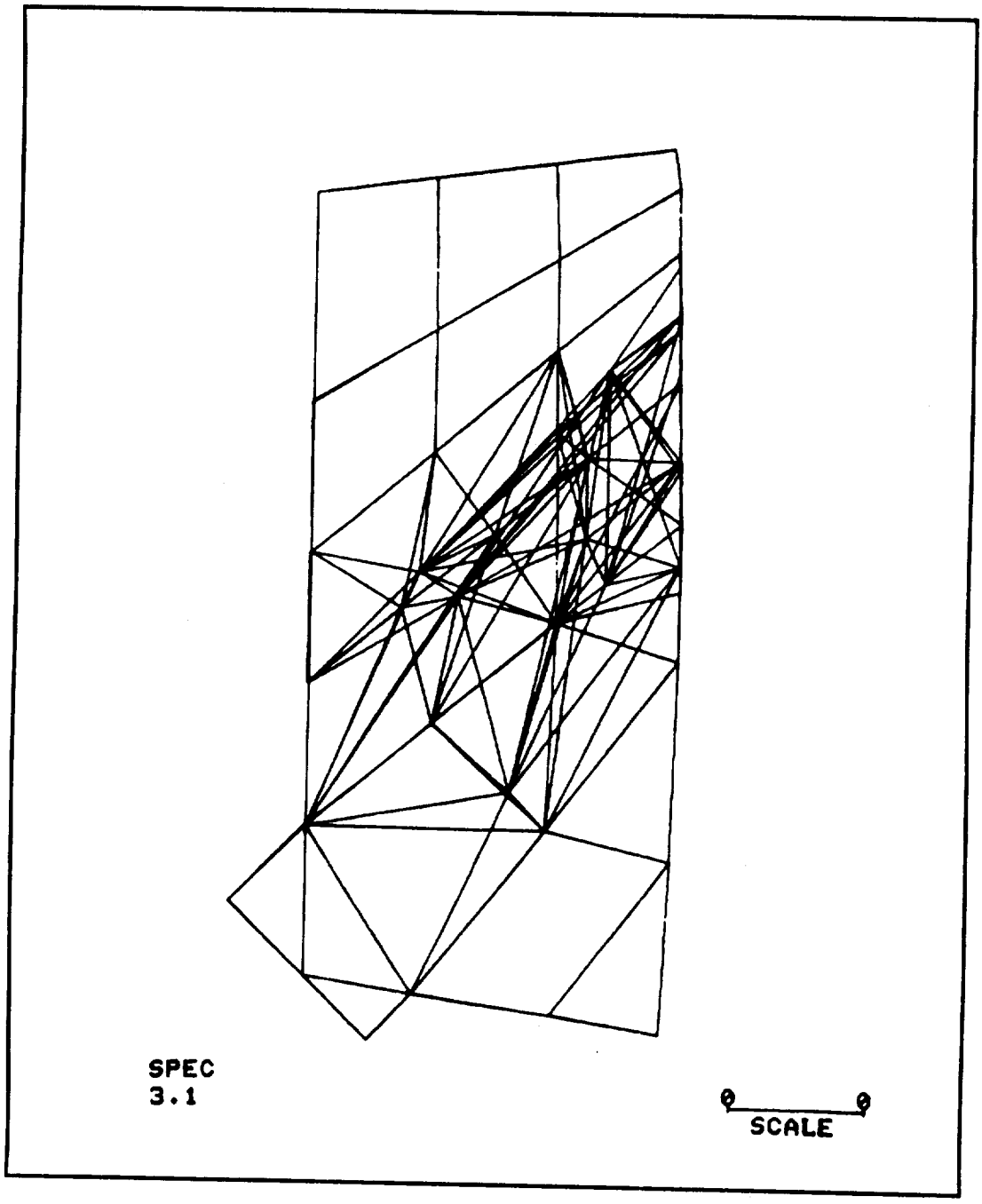


Figure 12 NASA-MSFC EAL HPFTP Impeller Model – Plot of Macroelement

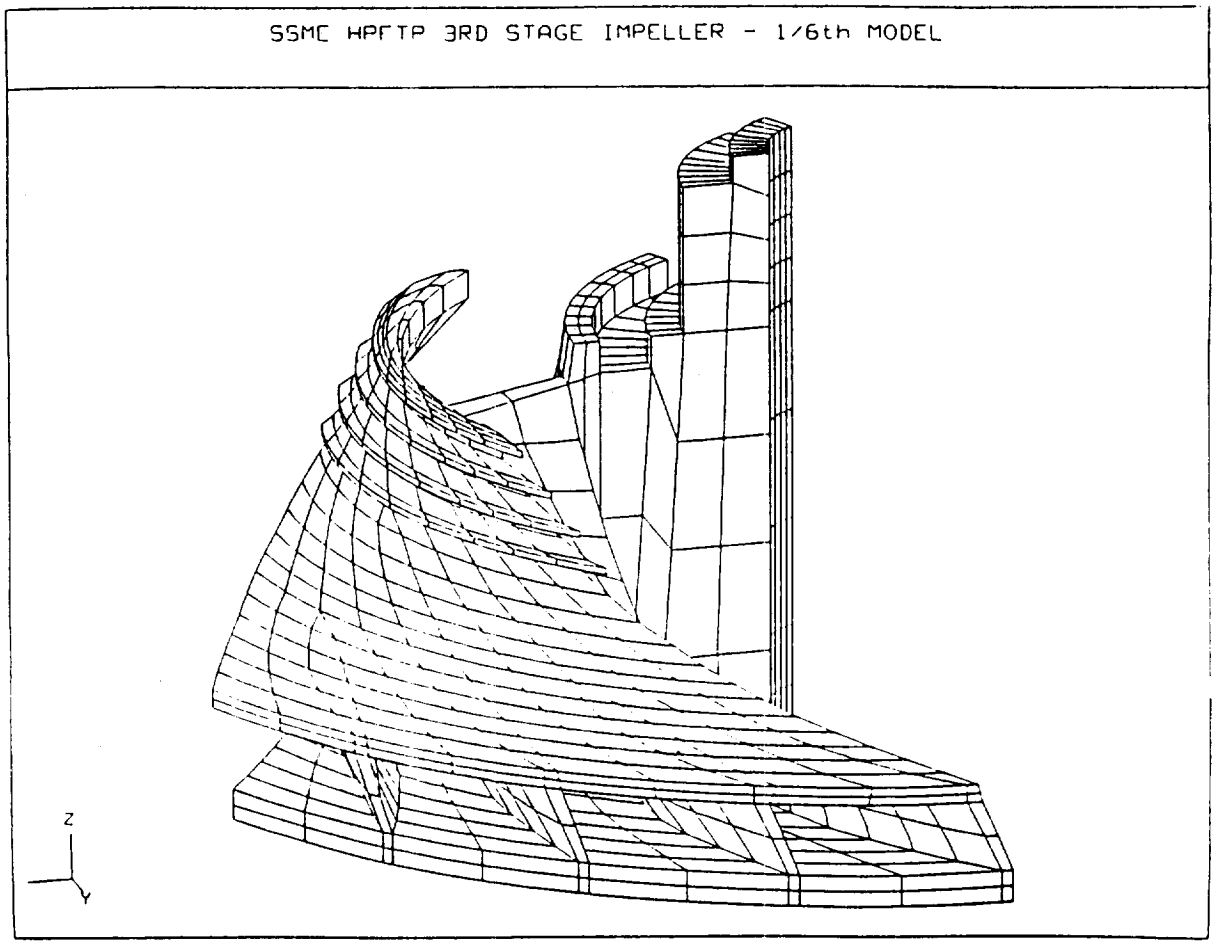


Figure 13 Lockheed DIAL HPFTP Impeller Model – Isometric View

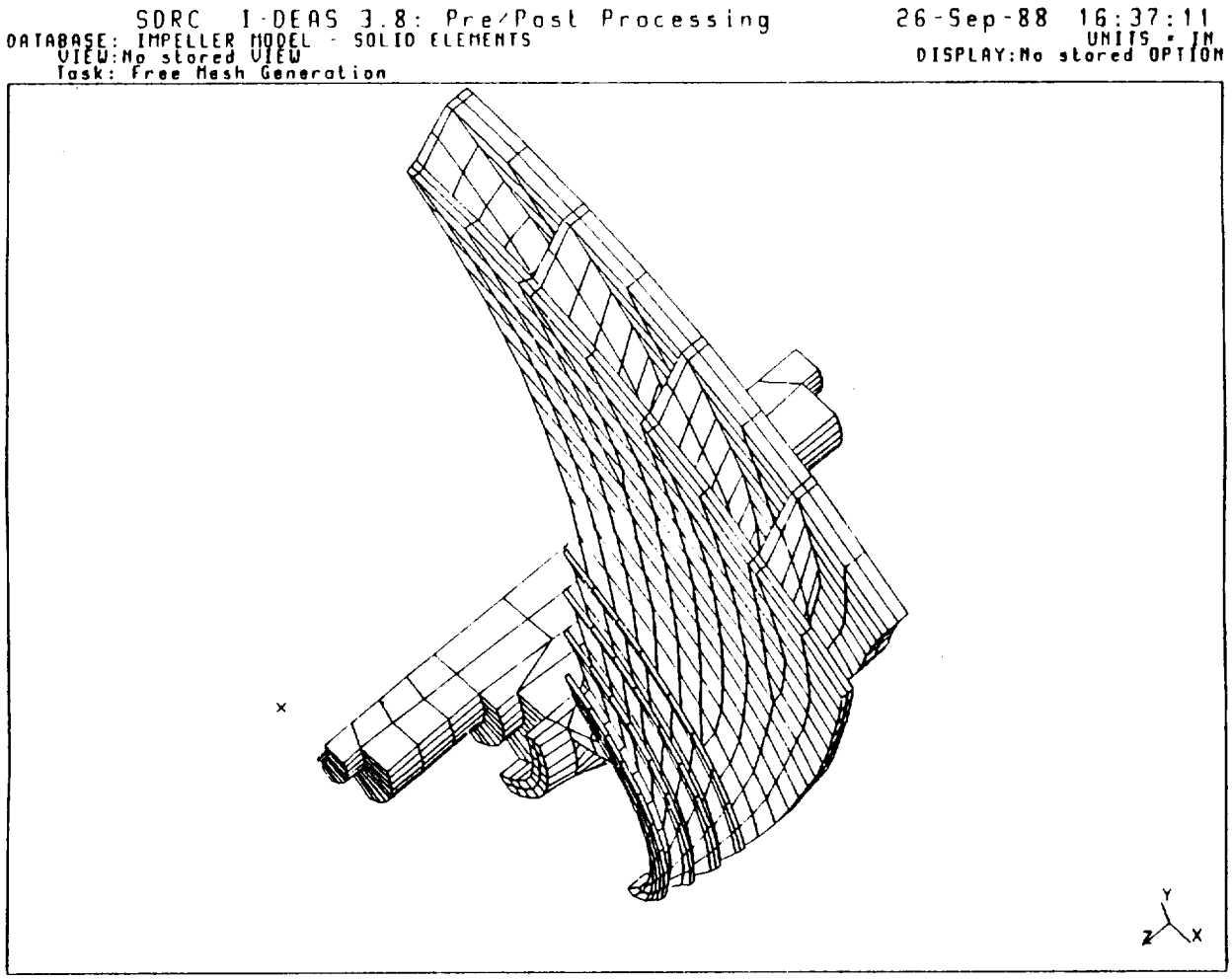


Figure 14 Lockheed EAL HPFTP Impeller Model – Isometric View

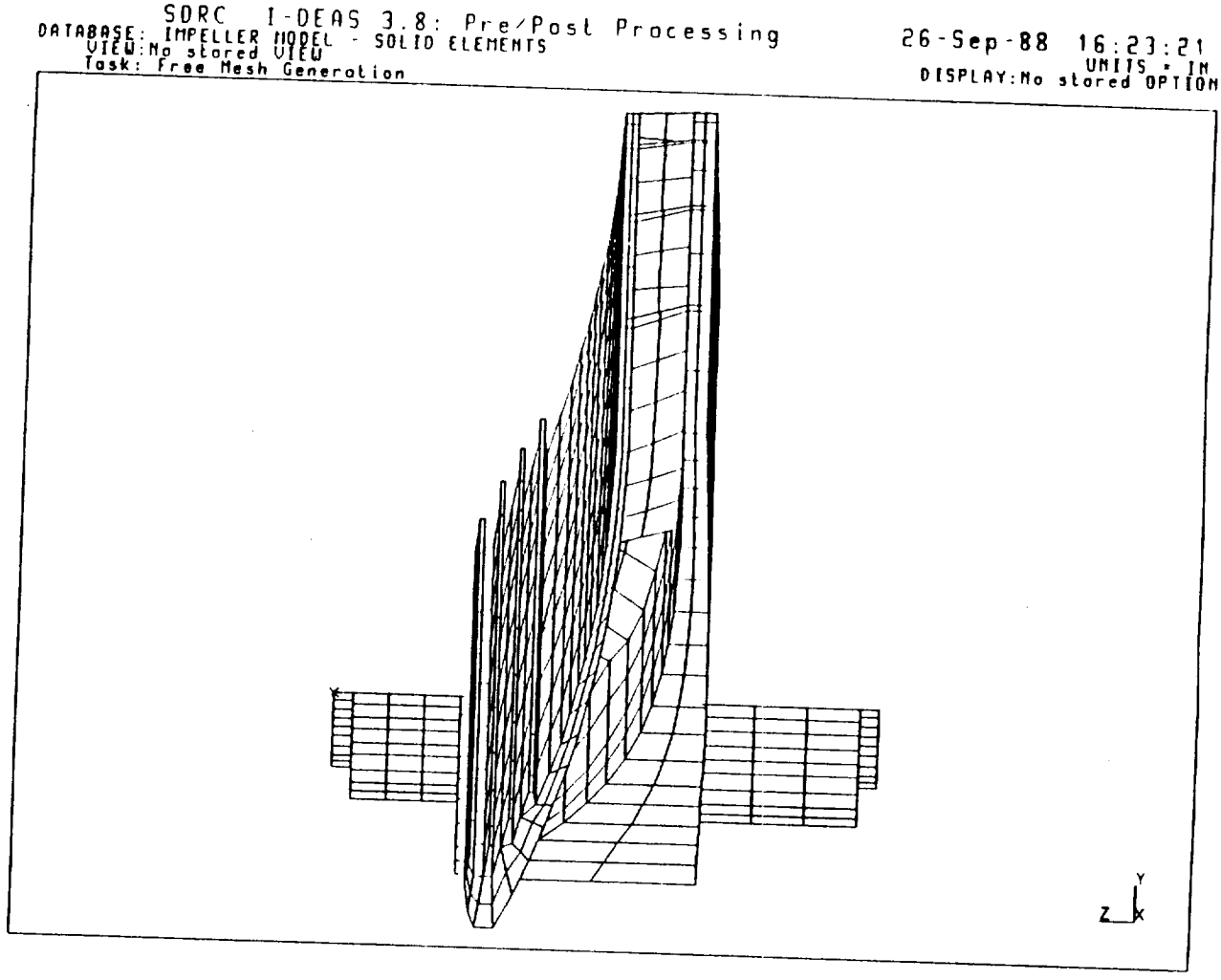


Figure 15 Lockheed EAL HPFTP Impeller Model – View Down the X Axis

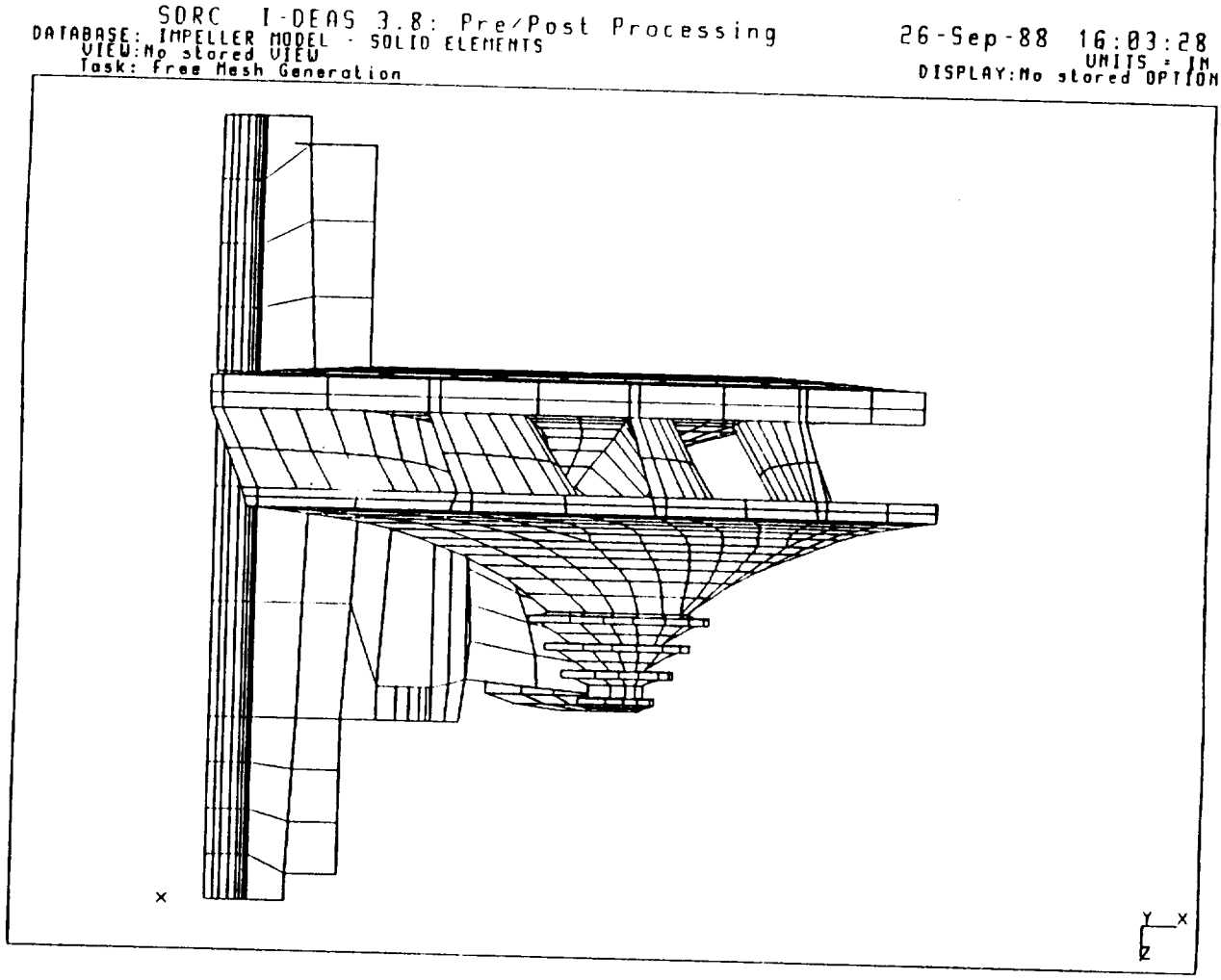


Figure 16 Lockheed EAL HPFTP Impeller Model – View Down the Y Axis

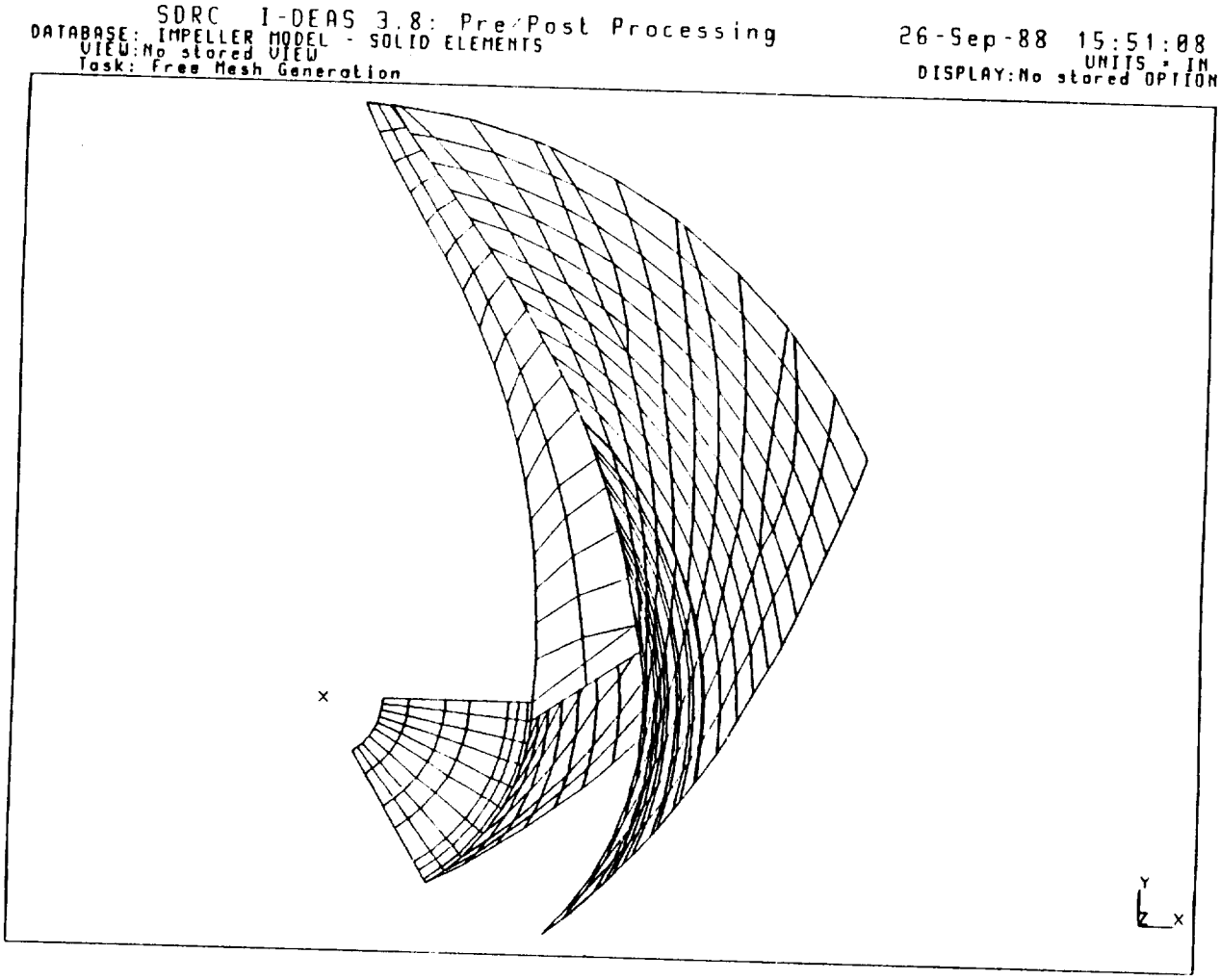
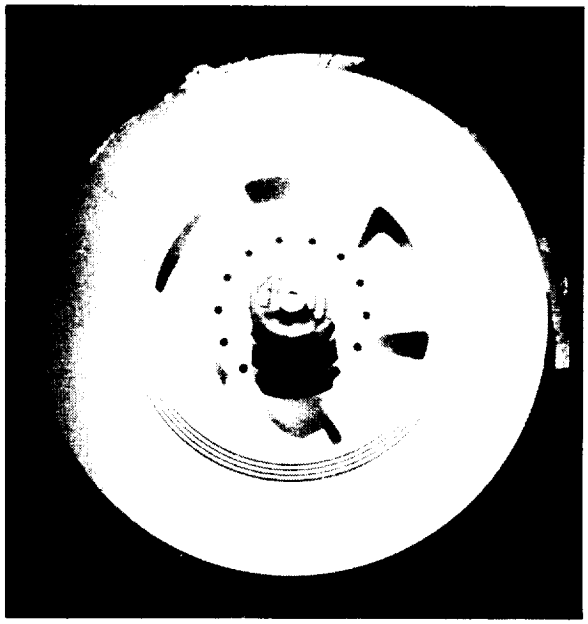
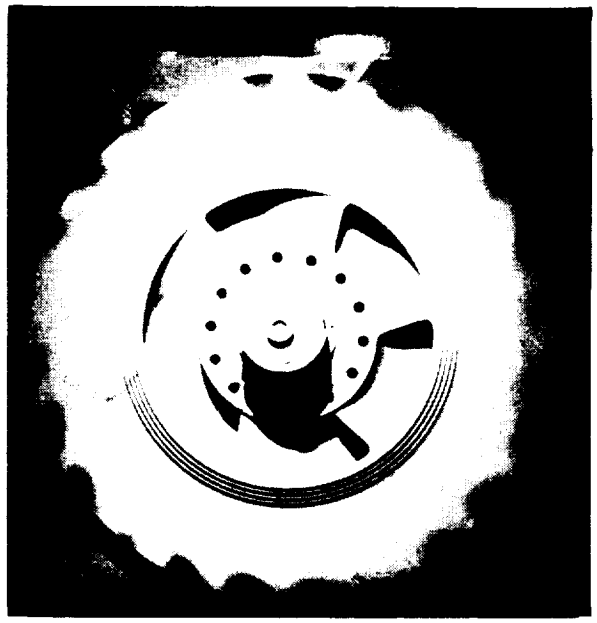


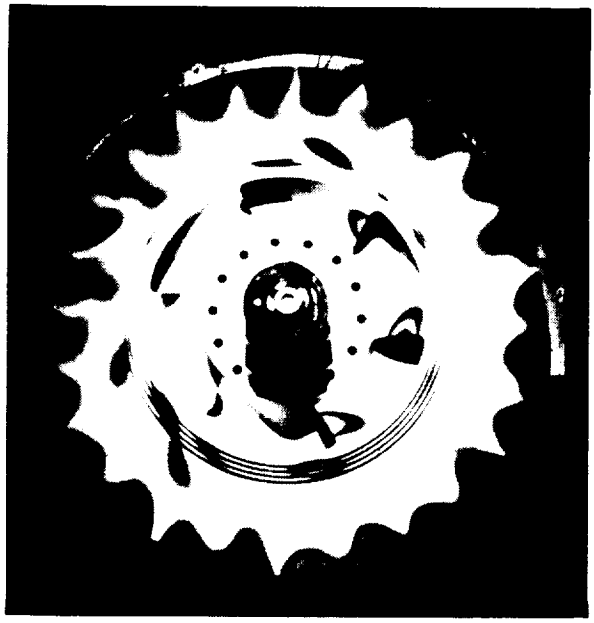
Figure 17 Lockheed EAL HPFTP Impeller Model – View Down the Z Axis



Still



19547 Hz (Room Temp)

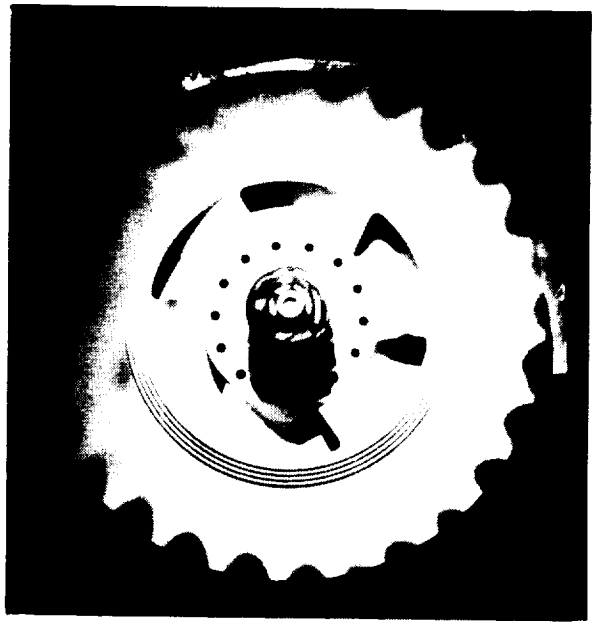


22197 Hz

Figure 18 First Stage Impeller Resonance Frequencies (1 of 6)

22279 Hz

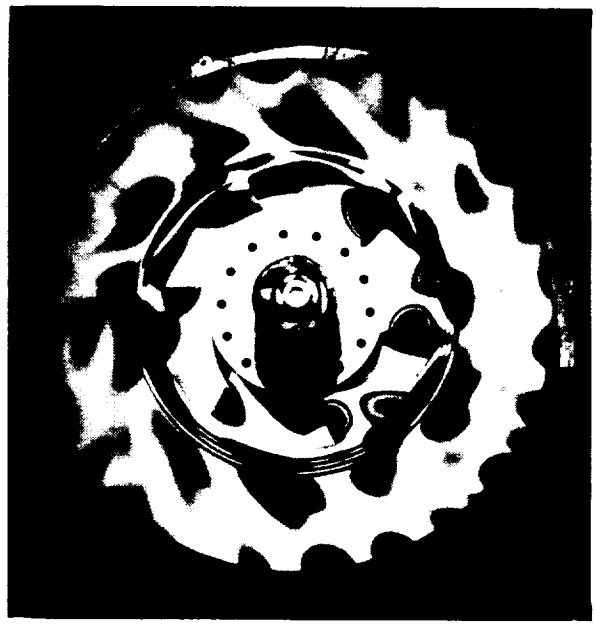
22658 Hz



22901 Hz

Figure 18 First Stage Impeller Resonance Frequencies (2 of 6)

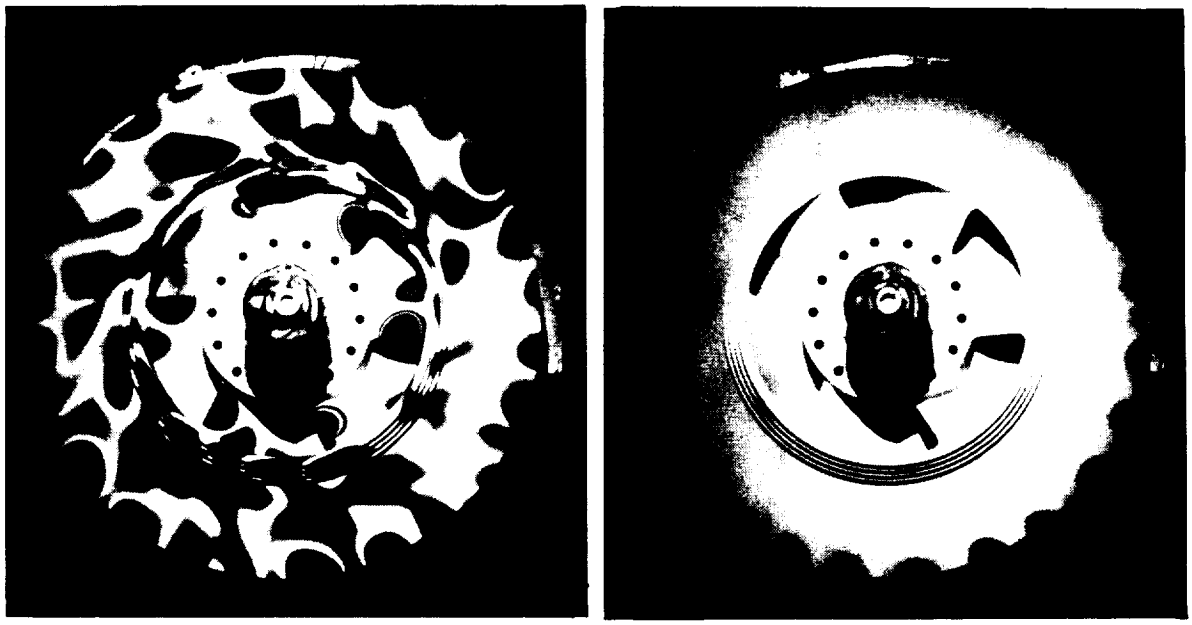
23046 Hz



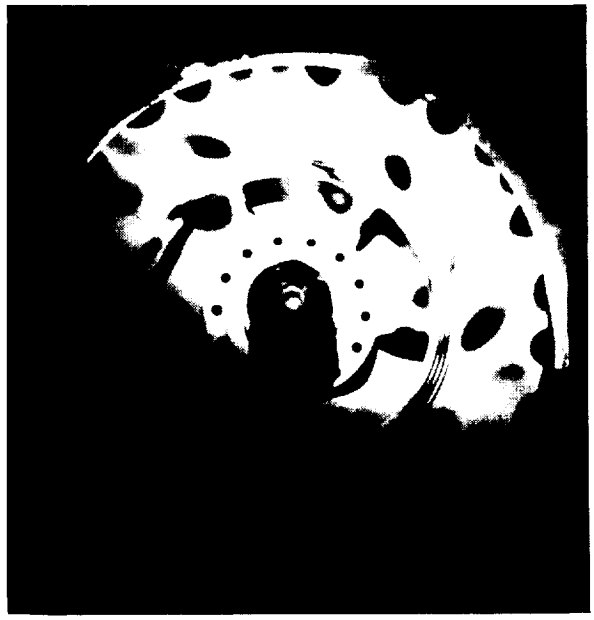
24771 Hz

24874 Hz

Figure 18 First Stage Impeller Resonance Frequencies (3 of 6)

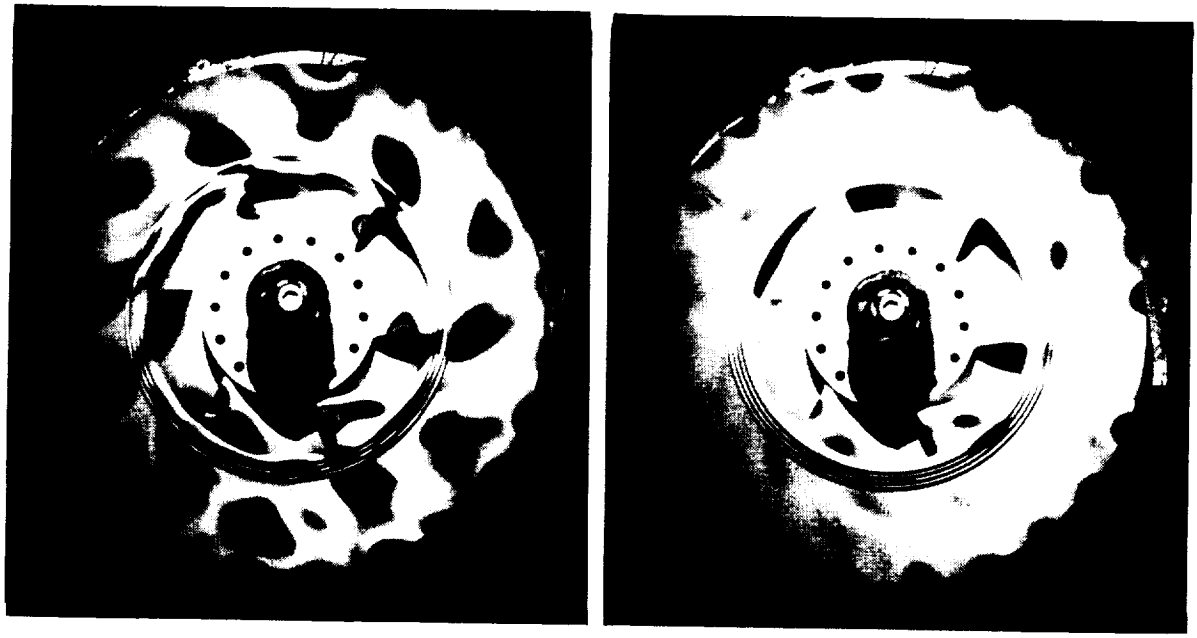


24926 Hz *25670 Hz*



27913 Hz

Figure 18 First Stage Impeller Resonance Frequencies (4 of 6)



27989 Hz *28105 Hz*

28245 Hz

Figure 18 First Stage Impeller Resonance Frequencies (5 of 6)

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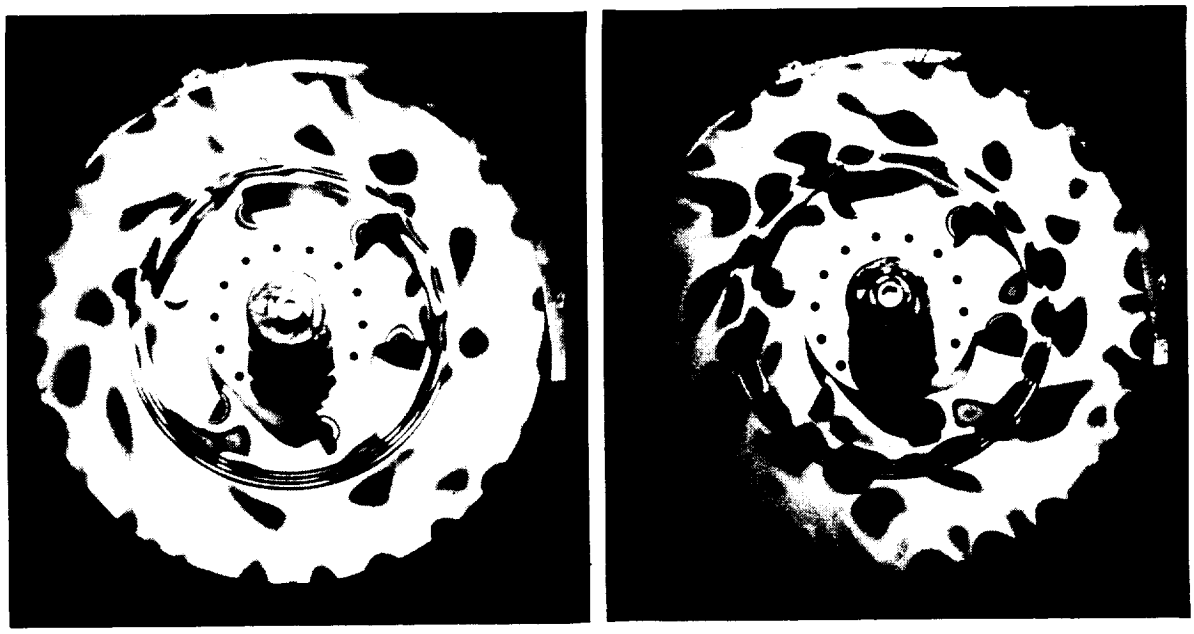
BLACK AND WHITE PHOTOGRAPH



29647 Hz *30393 Hz*

Figure 18 First Stage Impeller Resonance Frequencies (6 of 6)

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BLACK AND WHITE PHOTOGRAPH

APPENDIX A

EAL DATA LISTING - FUEL PUMP IMPELLER SOLID ELEMENT MODEL

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$ DELETE IMPELLER.OUT;*
$ ASSIGN IMPELLER.OUT FOR006
$ EAL316
'IMPELLER.
# *ONLINE=0
*CHAR '#*!"':>
# IMPELLER
# IMPELLER MODEL - SOLID ELEMENTS
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# 09-Sep-88    11:50:3
# 26-Oct-88    14:48:5
# SDRC  I-DEAS 3.8: Pre/Post Processing
# 26-Oct-88    14:51:0
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112	1.5489900E+00	-1.4780000E+00	-3.6550000E+00#	112	0	0
113	1.5489900E+00	-1.4780000E+00	-2.7407501E+00#	113	0	0
114	1.5489900E+00	-1.4780000E+00	-1.8265001E+00#	114	0	0
115	1.2357600E+00	-1.6606200E+00	-3.6550000E+00#	115	0	0
116	1.2357600E+00	-1.6606200E+00	-2.6074500E+00#	116	0	0
117	1.2357600E+00	-1.6606200E+00	-1.5599000E+00#	117	0	0
118	1.2089000E+00	-1.6245600E+00	-1.2650000E+00#	118	0	0
119	1.1656300E+00	-1.5663500E+00	-3.6550000E+00#	119	0	0
120	1.1656200E+00	-1.5663500E+00	-2.5914099E+00#	120	0	0
121	1.1656300E+00	-1.5663500E+00	-1.5274900E+00#	121	0	0
122	1.1522000E+00	-1.5483201E+00	-1.2650000E+00#	122	0	0
123	1.0955000E+00	-1.4720800E+00	-3.6550000E+00#	123	0	0
124	1.0955000E+00	-1.4720800E+00	-2.5750000E+00#	124	0	0
125	1.0955000E+00	-1.4720800E+00	-1.4950000E+00#	125	0	0
126	1.0955000E+00	-1.4720800E+00	-1.2650000E+00#	126	0	0
127	4.3906999E+00	3.9035001E+00	-3.6254001E+00#	127	0	0
128	4.3906999E+00	3.9035001E+00	-3.5089500E+00#	128	0	0
129	4.3906999E+00	3.9035001E+00	-3.3924999E+00#	129	0	0
130	4.3617001E+00	3.5218000E+00	-3.6379001E+00#	130	0	0
131	4.3617001E+00	3.5218000E+00	-3.5151999E+00#	131	0	0
132	4.3617001E+00	3.5218000E+00	-3.3924999E+00#	132	0	0
133	4.3232002E+00	3.1298001E+00	-3.6503999E+00#	133	0	0
134	4.3232002E+00	3.1298001E+00	-3.5214500E+00#	134	0	0
135	4.3232002E+00	3.1298001E+00	-3.3924999E+00#	135	0	0
136	4.2684002E+00	2.7327001E+00	-3.6630001E+00#	136	0	0
137	4.2684002E+00	2.7327001E+00	-3.5277500E+00#	137	0	0
138	4.2684002E+00	2.7327001E+00	-3.3924999E+00#	138	0	0
139	4.1718001E+00	2.3724999E+00	-3.6754999E+00#	139	0	0
140	4.1718001E+00	2.3724999E+00	-3.5339999E+00#	140	0	0
141	4.1718001E+00	2.3724999E+00	-3.3924999E+00#	141	0	0
142	4.0374999E+00	2.0564001E+00	-3.6880000E+00#	142	0	0
143	4.0374999E+00	2.0564001E+00	-3.5299001E+00#	143	0	0
144	4.0374999E+00	2.0564001E+00	-3.3717999E+00#	144	0	0
145	3.8775001E+00	1.7711999E+00	-3.7000000E+00#	145	0	0
146	3.8775001E+00	1.7711999E+00	-3.5256000E+00#	146	0	0

147	3.8775001E+00	1.7711999E+00	-3.3512001E+00#	147	0	0
148	3.7349999E+00	1.3810000E+00	-3.7000000E+00#	148	0	0
149	3.7349999E+00	1.3810000E+00	-3.5048001E+00#	149	0	0
150	3.7349999E+00	1.3810000E+00	-3.3096001E+00#	150	0	0
151	3.5668001E+00	1.0048000E+00	-3.7000000E+00#	151	0	0
152	3.5668001E+00	1.0048000E+00	-3.4731500E+00#	152	0	0
153	3.5668001E+00	1.0048000E+00	-3.2463000E+00#	153	0	0
154	3.3768001E+00	6.3069999E-01	-3.7000000E+00#	154	0	0
155	3.3768001E+00	6.3069999E-01	-3.4307499E+00#	155	0	0
156	3.3768001E+00	6.3069999E-01	-3.1615000E+00#	156	0	0
157	3.1645999E+00	2.5720000E-01	-3.7000000E+00#	157	0	0
158	3.1645999E+00	2.5720000E-01	-3.3748500E+00#	158	0	0
159	3.1645999E+00	2.5720000E-01	-3.0497000E+00#	159	0	0
160	2.9289999E+00	-8.9299999E-02	-3.6933000E+00#	160	0	0
161	2.9289999E+00	-8.9299999E-02	-3.3004000E+00#	161	0	0
162	2.9289999E+00	-8.9299999E-02	-2.9075000E+00#	162	0	0
163	2.6773000E+00	-4.0599999E-01	-3.6833000E+00#	163	0	0
164	2.6773000E+00	-4.0599999E-01	-3.2081001E+00#	164	0	0
165	2.6773000E+00	-4.0599999E-01	-2.7328999E+00#	165	0	0
166	2.4294000E+00	-6.8500000E-01	-3.6751001E+00#	166	0	0
167	2.4294000E+00	-6.8500000E-01	-3.1070001E+00#	167	0	0
168	2.4294000E+00	-6.8500000E-01	-2.5388999E+00#	168	0	0
169	2.1733999E+00	-9.2629999E-01	-3.6679001E+00#	169	0	0
170	2.1733999E+00	-9.2629999E-01	-2.9956000E+00#	170	0	0
171	2.1733999E+00	-9.2629999E-01	-2.3232999E+00#	171	0	0
172	1.9158000E+00	-1.1523000E+00	-3.6622000E+00#	172	0	0
173	1.9158000E+00	-1.1523000E+00	-2.8727500E+00#	173	0	0
174	1.9158000E+00	-1.1523000E+00	-2.0833001E+00#	174	0	0
175	1.6647000E+00	-1.3463000E+00	-3.6550000E+00#	175	0	0
176	1.6647000E+00	-1.3463000E+00	-2.7407501E+00#	176	0	0
177	1.6647000E+00	-1.3463000E+00	-1.8265001E+00#	177	0	0
178	1.4071000E+00	-1.5182000E+00	-3.6550000E+00#	178	0	0
179	1.4071000E+00	-1.5182000E+00	-2.6074500E+00#	179	0	0
180	1.4071000E+00	-1.5182000E+00	-1.5599000E+00#	180	0	0
181	1.3765000E+00	-1.4852000E+00	-1.2650000E+00#	181	0	0
182	1.3272500E+00	-1.4320000E+00	-3.6550000E+00#	182	0	0
183	1.3272500E+00	-1.4320000E+00	-2.5914099E+00#	183	0	0
184	1.3272500E+00	-1.4320000E+00	-1.5274900E+00#	184	0	0
185	1.3119500E+00	-1.4155000E+00	-1.2650000E+00#	185	0	0
186	1.2474000E+00	-1.3458000E+00	-3.6550000E+00#	186	0	0
187	1.2474000E+00	-1.3458000E+00	-2.5750000E+00#	187	0	0
188	1.2474000E+00	-1.3458000E+00	-1.4950000E+00#	188	0	0
189	1.2474000E+00	-1.3458000E+00	-1.2650000E+00#	189	0	0
190	4.3362999E+00	3.9639001E+00	-3.6254001E+00#	190	0	0
191	4.3362999E+00	3.9639001E+00	-3.5089500E+00#	191	0	0
192	4.3362999E+00	3.9639001E+00	-3.3924999E+00#	192	0	0
193	4.2326999E+00	3.6759000E+00	-3.6379001E+00#	193	0	0
194	4.2326999E+00	3.6759000E+00	-3.5151999E+00#	194	0	0
195	4.2326999E+00	3.6759000E+00	-3.3924999E+00#	195	0	0
196	4.1403999E+00	3.3678999E+00	-3.6503999E+00#	196	0	0
197	4.1403999E+00	3.3678999E+00	-3.5214500E+00#	197	0	0
198	4.1403999E+00	3.3678999E+00	-3.3924999E+00#	198	0	0
199	4.0507998E+00	3.0458000E+00	-3.6630001E+00#	199	0	0
200	4.0507998E+00	3.0458000E+00	-3.5277500E+00#	200	0	0
201	4.0507998E+00	3.0458000E+00	-3.3924999E+00#	201	0	0
202	3.9639001E+00	2.7056000E+00	-3.6754999E+00#	202	0	0

203	3.9639001E+00	2.7056000E+00	-3.5339999E+00#	203	0	0
204	3.9639001E+00	2.7056000E+00	-3.3924999E+00#	204	0	0
205	3.9138999E+00	2.2829001E+00	-3.6880000E+00#	205	0	0
206	3.9138999E+00	2.2829001E+00	-3.5299001E+00#	206	0	0
207	3.9138999E+00	2.2829001E+00	-3.3717999E+00#	207	0	0
208	3.8131800E+00	4.4694099E+00	-3.6254001E+00#	208	0	0
209	3.8131800E+00	4.4694099E+00	-3.5089500E+00#	209	0	0
210	3.8131800E+00	4.4694099E+00	-3.3924999E+00#	210	0	0
211	3.7908700E+00	4.1300802E+00	-3.6379001E+00#	211	0	0
212	3.7908700E+00	4.1300802E+00	-3.5151999E+00#	212	0	0
213	3.7908700E+00	4.1300802E+00	-3.3924999E+00#	213	0	0
214	3.7705500E+00	3.7773399E+00	-3.6503999E+00#	214	0	0
215	3.7705500E+00	3.7773399E+00	-3.5214500E+00#	215	0	0
216	3.7705500E+00	3.7773399E+00	-3.3924999E+00#	216	0	0
217	3.7495501E+00	3.4098699E+00	-3.6630001E+00#	217	0	0
218	3.7495501E+00	3.4098699E+00	-3.5277500E+00#	218	0	0
219	3.7495501E+00	3.4098699E+00	-3.3924999E+00#	219	0	0
220	3.7196100E+00	3.0327201E+00	-3.6754999E+00#	220	0	0
221	3.7196100E+00	3.0327201E+00	-3.5339999E+00#	221	0	0
222	3.7196100E+00	3.0327201E+00	-3.3924999E+00#	222	0	0
223	3.6933801E+00	2.6247301E+00	-3.6880000E+00#	223	0	0
224	3.6933801E+00	2.6247301E+00	-3.5299001E+00#	224	0	0
225	3.6933801E+00	2.6247301E+00	-3.3717999E+00#	225	0	0
226	3.6680801E+00	2.1719201E+00	-3.7000000E+00#	226	0	0
227	3.6680801E+00	2.1719201E+00	-3.5256000E+00#	227	0	0
228	3.6680801E+00	2.1719201E+00	-3.3512001E+00#	228	0	0
229	3.5674300E+00	1.7693800E+00	-3.7000000E+00#	229	0	0
230	3.5674300E+00	1.7693800E+00	-3.5048001E+00#	230	0	0
231	3.5674300E+00	1.7693800E+00	-3.3096001E+00#	231	0	0
232	3.4401100E+00	1.3774700E+00	-3.7000000E+00#	232	0	0
233	3.4401100E+00	1.3774700E+00	-3.4731500E+00#	233	0	0
234	3.4401100E+00	1.3774700E+00	-3.2463000E+00#	234	0	0
235	3.2910500E+00	9.8468000E-01	-3.7000000E+00#	235	0	0
236	3.2910500E+00	9.8468000E-01	-3.4307499E+00#	236	0	0
237	3.2910500E+00	9.8468000E-01	-3.1615000E+00#	237	0	0
238	3.1183300E+00	5.9733999E-01	-3.7000000E+00#	238	0	0
239	3.1183300E+00	5.9733999E-01	-3.3748500E+00#	239	0	0
240	3.1183300E+00	5.9733999E-01	-3.0497000E+00#	240	0	0
241	2.9185700E+00	2.6304999E-01	-3.6933000E+00#	241	0	0
242	2.9185700E+00	2.6304999E-01	-3.3004000E+00#	242	0	0
243	2.9185700E+00	2.6304999E-01	-2.9075000E+00#	243	0	0
244	2.7079201E+00	-2.5800001E-03	-3.6833000E+00#	244	0	0
245	2.7079201E+00	-2.5800001E-03	-3.2081001E+00#	245	0	0
246	2.7079201E+00	-2.5800001E-03	-2.7328999E+00#	246	0	0
247	2.5043600E+00	-3.1536999E-01	-3.6751001E+00#	247	0	0
248	2.5043600E+00	-3.1536999E-01	-3.1070001E+00#	248	0	0
249	2.5043600E+00	-3.1536999E-01	-2.5388999E+00#	249	0	0
250	2.2871799E+00	-5.9215999E-01	-3.6679001E+00#	250	0	0
251	2.2871799E+00	-5.9215999E-01	-2.9956000E+00#	251	0	0
252	2.2871799E+00	-5.9215999E-01	-2.3232999E+00#	252	0	0
253	2.0661099E+00	-8.5398000E-01	-3.6622000E+00#	253	0	0
254	2.0661099E+00	-8.5398000E-01	-2.8727500E+00#	254	0	0
255	2.0661099E+00	-8.5398000E-01	-2.0833001E+00#	255	0	0
256	1.8467100E+00	-1.0832400E+00	-3.6550000E+00#	256	0	0
257	1.8467100E+00	-1.0832400E+00	-2.7407501E+00#	257	0	0
258	1.8467100E+00	-1.0832400E+00	-1.8265001E+00#	258	0	0

259	1.6176000E+00	-1.2916200E+00	-3.6550000E+00#	259	0	0
260	1.6176000E+00	-1.2916200E+00	-2.6074500E+00#	260	0	0
261	1.6176000E+00	-1.2916200E+00	-1.5599000E+00#	261	0	0
262	1.5824200E+00	-1.2635000E+00	-1.2650000E+00#	262	0	0
263	1.5258000E+00	-1.2182699E+00	-3.6550000E+00#	263	0	0
264	1.5258000E+00	-1.2182699E+00	-2.5914099E+00#	264	0	0
265	1.5258000E+00	-1.2182699E+00	-1.5274900E+00#	265	0	0
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267	1.4340100E+00	-1.1449300E+00	-3.6550000E+00#	267	0	0
268	1.4340100E+00	-1.1449300E+00	-2.5750000E+00#	268	0	0
269	1.4340100E+00	-1.1449300E+00	-1.4950000E+00#	269	0	0
270	1.4340100E+00	-1.1449300E+00	-1.2650000E+00#	270	0	0
271	3.2316000E+00	4.9064002E+00	-3.6254001E+00#	271	0	0
272	3.2316000E+00	4.9064002E+00	-3.5089500E+00#	272	0	0
273	3.2316000E+00	4.9064002E+00	-3.3924999E+00#	273	0	0
274	3.3006001E+00	4.5314999E+00	-3.6379001E+00#	274	0	0
275	3.3006001E+00	4.5314999E+00	-3.5151999E+00#	275	0	0
276	3.3006001E+00	4.5314999E+00	-3.3924999E+00#	276	0	0
277	3.3604000E+00	4.1464000E+00	-3.6503999E+00#	277	0	0
278	3.3604000E+00	4.1464000E+00	-3.5214500E+00#	278	0	0
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280	3.4157000E+00	3.7442999E+00	-3.6630001E+00#	280	0	0
281	3.4157000E+00	3.7442999E+00	-3.5277500E+00#	281	0	0
282	3.4157000E+00	3.7442999E+00	-3.3924999E+00#	282	0	0
283	3.4484000E+00	3.3378999E+00	-3.6754999E+00#	283	0	0
284	3.4484000E+00	3.3378999E+00	-3.5339999E+00#	284	0	0
285	3.4484000E+00	3.3378999E+00	-3.3924999E+00#	285	0	0
286	3.4431000E+00	2.9454000E+00	-3.6880000E+00#	286	0	0
287	3.4431000E+00	2.9454000E+00	-3.5299001E+00#	287	0	0
288	3.4431000E+00	2.9454000E+00	-3.3717999E+00#	288	0	0
289	3.4173999E+00	2.5481999E+00	-3.7000000E+00#	289	0	0
290	3.4173999E+00	2.5481999E+00	-3.5256000E+00#	290	0	0
291	3.4173999E+00	2.5481999E+00	-3.3512001E+00#	291	0	0
292	3.3596001E+00	2.1378000E+00	-3.7000000E+00#	292	0	0
293	3.3596001E+00	2.1378000E+00	-3.5048001E+00#	293	0	0
294	3.3596001E+00	2.1378000E+00	-3.3096001E+00#	294	0	0
295	3.2746000E+00	1.7345999E+00	-3.7000000E+00#	295	0	0
296	3.2746000E+00	1.7345999E+00	-3.4731500E+00#	296	0	0
297	3.2746000E+00	1.7345999E+00	-3.2463000E+00#	297	0	0
298	3.1682999E+00	1.3276000E+00	-3.7000000E+00#	298	0	0
299	3.1682999E+00	1.3276000E+00	-3.4307499E+00#	299	0	0
300	3.1682999E+00	1.3276000E+00	-3.1615000E+00#	300	0	0
301	3.0355999E+00	9.3049997E-01	-3.7000000E+00#	301	0	0
302	3.0355999E+00	9.3049997E-01	-3.3748500E+00#	302	0	0
303	3.0355999E+00	9.3049997E-01	-3.0497000E+00#	303	0	0
304	2.8659000E+00	6.1159998E-01	-3.6933000E+00#	304	0	0
305	2.8659000E+00	6.1159998E-01	-3.3004000E+00#	305	0	0
306	2.8659000E+00	6.1159998E-01	-2.9075000E+00#	306	0	0
307	2.6781001E+00	4.0090001E-01	-3.6833000E+00#	307	0	0
308	2.6781001E+00	4.0090001E-01	-3.2081001E+00#	308	0	0
309	2.6781001E+00	4.0090001E-01	-2.7328999E+00#	309	0	0
310	2.5234001E+00	6.1299998E-02	-3.6751001E+00#	310	0	0
311	2.5234001E+00	6.1299998E-02	-3.1070001E+00#	311	0	0
312	2.5234001E+00	6.1299998E-02	-2.5388999E+00#	312	0	0
313	2.3499000E+00	-2.4480000E-01	-3.6679001E+00#	313	0	0
314	2.3499000E+00	-2.4480000E-01	-2.9956000E+00#	314	0	0

315	2.3499000E+00	-2.4480000E-01	-2.3232999E+00#	315	0	0
316	2.1703000E+00	-5.3659999E-01	-3.6622000E+00#	316	0	0
317	2.1703000E+00	-5.3659999E-01	-2.8727500E+00#	317	0	0
318	2.1703000E+00	-5.3659999E-01	-2.0833001E+00#	318	0	0
319	1.9875000E+00	-7.9600000E-01	-3.6550000E+00#	319	0	0
320	1.9875000E+00	-7.9600000E-01	-2.7407501E+00#	320	0	0
321	1.9875000E+00	-7.9600000E-01	-1.8265001E+00#	321	0	0
322	1.7920001E+00	-1.0362000E+00	-3.6550000E+00#	322	0	0
323	1.7920001E+00	-1.0362000E+00	-2.6074500E+00#	323	0	0
324	1.7920001E+00	-1.0362000E+00	-1.5599000E+00#	324	0	0
325	1.7530000E+00	-1.0136000E+00	-1.2650000E+00#	325	0	0
326	1.6903000E+00	-9.7735000E-01	-3.6550000E+00#	326	0	0
327	1.6903000E+00	-9.7735000E-01	-2.5914099E+00#	327	0	0
328	1.6903000E+00	-9.7735000E-01	-1.5274900E+00#	328	0	0
329	1.6708000E+00	-9.6605003E-01	-1.2650000E+00#	329	0	0
330	1.5886000E+00	-9.1850001E-01	-3.6550000E+00#	330	0	0
331	1.5886000E+00	-9.1850001E-01	-2.5750000E+00#	331	0	0
332	1.5886000E+00	-9.1850001E-01	-1.4950000E+00#	332	0	0
333	1.5886000E+00	-9.1850001E-01	-1.2650000E+00#	333	0	0
334	3.1633999E+00	4.9506001E+00	-3.6254001E+00#	334	0	0
335	3.1633999E+00	4.9506001E+00	-3.5089500E+00#	335	0	0
336	3.1633999E+00	4.9506001E+00	-3.3924999E+00#	336	0	0
337	3.1372001E+00	4.6461000E+00	-3.6379001E+00#	337	0	0
338	3.1372001E+00	4.6461000E+00	-3.5151999E+00#	338	0	0
339	3.1372001E+00	4.6461000E+00	-3.3924999E+00#	339	0	0
340	3.1243000E+00	4.3270998E+00	-3.6503999E+00#	340	0	0
341	3.1243000E+00	4.3270998E+00	-3.5214500E+00#	341	0	0
342	3.1243000E+00	4.3270998E+00	-3.3924999E+00#	342	0	0
343	3.1208000E+00	3.9934001E+00	-3.6630001E+00#	343	0	0
344	3.1208000E+00	3.9934001E+00	-3.5277500E+00#	344	0	0
345	3.1208000E+00	3.9934001E+00	-3.3924999E+00#	345	0	0
346	3.1273000E+00	3.6403999E+00	-3.6754999E+00#	346	0	0
347	3.1273000E+00	3.6403999E+00	-3.5339999E+00#	347	0	0
348	3.1273000E+00	3.6403999E+00	-3.3924999E+00#	348	0	0
349	3.1436000E+00	3.2632000E+00	-3.6880000E+00#	349	0	0
350	3.1436000E+00	3.2632000E+00	-3.5299001E+00#	350	0	0
351	3.1436000E+00	3.2632000E+00	-3.3717999E+00#	351	0	0
352	3.1250000E+00	2.8994000E+00	-3.7000000E+00#	352	0	0
353	3.1250000E+00	2.8994000E+00	-3.5256000E+00#	353	0	0
354	3.1250000E+00	2.8994000E+00	-3.3512001E+00#	354	0	0
355	3.0955000E+00	2.5050001E+00	-3.7000000E+00#	355	0	0
356	3.0955000E+00	2.5050001E+00	-3.5048001E+00#	356	0	0
357	3.0955000E+00	2.5050001E+00	-3.3096001E+00#	357	0	0
358	3.0571001E+00	2.0943000E+00	-3.7000000E+00#	358	0	0
359	3.0571001E+00	2.0943000E+00	-3.4731500E+00#	359	0	0
360	3.0571001E+00	2.0943000E+00	-3.2463000E+00#	360	0	0
361	2.9876001E+00	1.6955000E+00	-3.7000000E+00#	361	0	0
362	2.9876001E+00	1.6955000E+00	-3.4307499E+00#	362	0	0
363	2.9876001E+00	1.6955000E+00	-3.1615000E+00#	363	0	0
364	2.8970001E+00	1.2993000E+00	-3.7000000E+00#	364	0	0
365	2.8970001E+00	1.2993000E+00	-3.3748500E+00#	365	0	0
366	2.8970001E+00	1.2993000E+00	-3.0497000E+00#	366	0	0
367	2.7938001E+00	8.8419998E-01	-3.6933000E+00#	367	0	0
368	2.7938001E+00	8.8419998E-01	-3.3004000E+00#	368	0	0
369	2.7938001E+00	8.8419998E-01	-2.9075000E+00#	369	0	0
370	2.5265200E+00	5.3040099E+00	-3.6254001E+00#	370	0	0

371	2.5265200E+00	5.3040099E+00	-3.5089500E+00#	371	0	0
372	2.5265200E+00	5.3040099E+00	-3.3924999E+00#	372	0	0
373	2.5933800E+00	4.9701400E+00	-3.6379001E+00#	373	0	0
374	2.5933800E+00	4.9701400E+00	-3.5151999E+00#	374	0	0
375	2.5933800E+00	4.9701400E+00	-3.3924999E+00#	375	0	0
376	2.6656599E+00	4.6238198E+00	-3.6503999E+00#	376	0	0
377	2.6656599E+00	4.6238198E+00	-3.5214500E+00#	377	0	0
378	2.6656599E+00	4.6238198E+00	-3.3924999E+00#	378	0	0
379	2.7372799E+00	4.2654099E+00	-3.6630001E+00#	379	0	0
380	2.7372799E+00	4.2654099E+00	-3.5277500E+00#	380	0	0
381	2.7372799E+00	4.2654099E+00	-3.3924999E+00#	381	0	0
382	2.7882299E+00	3.9061899E+00	-3.6754999E+00#	382	0	0
383	2.7882299E+00	3.9061899E+00	-3.5339999E+00#	383	0	0
384	2.7882299E+00	3.9061899E+00	-3.3924999E+00#	384	0	0
385	2.8187900E+00	3.5475500E+00	-3.6880000E+00#	385	0	0
386	2.8187900E+00	3.5475500E+00	-3.5299001E+00#	386	0	0
387	2.8187900E+00	3.5475500E+00	-3.3717999E+00#	387	0	0
388	2.8133399E+00	3.2027199E+00	-3.7000000E+00#	388	0	0
389	2.8133399E+00	3.2027199E+00	-3.5256000E+00#	389	0	0
390	2.8133399E+00	3.2027199E+00	-3.3512001E+00#	390	0	0
391	2.8335900E+00	2.7978699E+00	-3.7000000E+00#	391	0	0
392	2.8335900E+00	2.7978699E+00	-3.5048001E+00#	392	0	0
393	2.8335900E+00	2.7978699E+00	-3.3096001E+00#	393	0	0
394	2.8356199E+00	2.3855801E+00	-3.7000000E+00#	394	0	0
395	2.8356199E+00	2.3855801E+00	-3.4731500E+00#	395	0	0
396	2.8356199E+00	2.3855801E+00	-3.2463000E+00#	396	0	0
397	2.8113000E+00	1.9741400E+00	-3.7000000E+00#	397	0	0
398	2.8113000E+00	1.9741400E+00	-3.4307499E+00#	398	0	0
399	2.8113000E+00	1.9741400E+00	-3.1615000E+00#	399	0	0
400	2.7660799E+00	1.5586801E+00	-3.7000000E+00#	400	0	0
401	2.7660799E+00	1.5586801E+00	-3.3748500E+00#	401	0	0
402	2.7660799E+00	1.5586801E+00	-3.0497000E+00#	402	0	0
403	2.6992400E+00	1.1406600E+00	-3.6933000E+00#	403	0	0
404	2.6992400E+00	1.1406600E+00	-3.3004000E+00#	404	0	0
405	2.6992400E+00	1.1406600E+00	-2.9075000E+00#	405	0	0
406	2.6163099E+00	6.9835001E-01	-3.6833000E+00#	406	0	0
407	2.6163099E+00	6.9835001E-01	-3.2081001E+00#	407	0	0
408	2.6163099E+00	6.9835001E-01	-2.7328999E+00#	408	0	0
409	2.5006399E+00	3.4356001E-01	-3.6751001E+00#	409	0	0
410	2.5006399E+00	3.4356001E-01	-3.1070001E+00#	410	0	0
411	2.5006399E+00	3.4356001E-01	-2.5388999E+00#	411	0	0
412	2.3625200E+00	1.9980000E-02	-3.6679001E+00#	412	0	0
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414	2.3625200E+00	1.9980000E-02	-2.3232999E+00#	414	0	0
415	2.2167499E+00	-2.9012999E-01	-3.6622000E+00#	415	0	0
416	2.2167499E+00	-2.9012999E-01	-2.8727500E+00#	416	0	0
417	2.2167499E+00	-2.9012999E-01	-2.0833001E+00#	417	0	0
418	2.0641899E+00	-5.6838000E-01	-3.6550000E+00#	418	0	0
419	2.0641899E+00	-5.6838000E-01	-2.7407501E+00#	419	0	0
420	2.0641899E+00	-5.6838000E-01	-1.8265001E+00#	420	0	0
421	1.8967900E+00	-8.2892001E-01	-3.6550000E+00#	421	0	0
422	1.8967900E+00	-8.2892001E-01	-2.6074500E+00#	422	0	0
423	1.8967900E+00	-8.2892001E-01	-1.5599000E+00#	423	0	0
424	1.8555300E+00	-8.1085998E-01	-1.2650000E+00#	424	0	0
425	1.7891400E+00	-7.8184998E-01	-3.6550000E+00#	425	0	0
426	1.7891300E+00	-7.8184003E-01	-2.5914099E+00#	426	0	0

427	1.7891400E+00	-7.8184003E-01	-1.5274900E+00#	427	0	0
428	1.7685100E+00	-7.7280998E-01	-1.2650000E+00#	428	0	0
429	1.6814801E+00	-7.3477000E-01	-3.6550000E+00#	429	0	0
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431	1.6814801E+00	-7.3477000E-01	-1.4950000E+00#	431	0	0
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433	1.8508000E+00	5.5759001E+00	-3.6254001E+00#	433	0	0
434	1.8508000E+00	5.5759001E+00	-3.5089500E+00#	434	0	0
435	1.8508000E+00	5.5759001E+00	-3.3924999E+00#	435	0	0
436	2.0165000E+00	5.2308002E+00	-3.6379001E+00#	436	0	0
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439	2.1791000E+00	4.8720999E+00	-3.6503999E+00#	439	0	0
440	2.1791000E+00	4.8720999E+00	-3.5214500E+00#	440	0	0
441	2.1791000E+00	4.8720999E+00	-3.3924999E+00#	441	0	0
442	2.3302000E+00	4.5007000E+00	-3.6630001E+00#	442	0	0
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444	2.3302000E+00	4.5007000E+00	-3.3924999E+00#	444	0	0
445	2.4267001E+00	4.1405001E+00	-3.6754999E+00#	445	0	0
446	2.4267001E+00	4.1405001E+00	-3.5339999E+00#	446	0	0
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448	2.4684000E+00	3.7997000E+00	-3.6880000E+00#	448	0	0
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450	2.4684000E+00	3.7997000E+00	-3.3717999E+00#	450	0	0
451	2.4724000E+00	3.4727001E+00	-3.7000000E+00#	451	0	0
452	2.4724000E+00	3.4727001E+00	-3.5256000E+00#	452	0	0
453	2.4724000E+00	3.4727001E+00	-3.3512001E+00#	453	0	0
454	2.5441000E+00	3.0634999E+00	-3.7000000E+00#	454	0	0
455	2.5441000E+00	3.0634999E+00	-3.5048001E+00#	455	0	0
456	2.5441000E+00	3.0634999E+00	-3.3096001E+00#	456	0	0
457	2.5864999E+00	2.6536000E+00	-3.7000000E+00#	457	0	0
458	2.5864999E+00	2.6536000E+00	-3.4731500E+00#	458	0	0
459	2.5864999E+00	2.6536000E+00	-3.2463000E+00#	459	0	0
460	2.6091001E+00	2.2346001E+00	-3.7000000E+00#	460	0	0
461	2.6091001E+00	2.2346001E+00	-3.4307499E+00#	461	0	0
462	2.6091001E+00	2.2346001E+00	-3.1615000E+00#	462	0	0
463	2.6120000E+00	1.8049999E+00	-3.7000000E+00#	463	0	0
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465	2.6120000E+00	1.8049999E+00	-3.0497000E+00#	465	0	0
466	2.5811999E+00	1.3872000E+00	-3.6933000E+00#	466	0	0
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468	2.5811999E+00	1.3872000E+00	-2.9075000E+00#	468	0	0
469	2.5216000E+00	9.8699999E-01	-3.6833000E+00#	469	0	0
470	2.5216000E+00	9.8699999E-01	-3.2081001E+00#	470	0	0
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472	2.4463999E+00	6.2150002E-01	-3.6751001E+00#	472	0	0
473	2.4463999E+00	6.2150002E-01	-3.1070001E+00#	473	0	0
474	2.4463999E+00	6.2150002E-01	-2.5388999E+00#	474	0	0
475	2.3454001E+00	2.8450000E-01	-3.6679001E+00#	475	0	0
476	2.3454001E+00	2.8450000E-01	-2.9956000E+00#	476	0	0
477	2.3454001E+00	2.8450000E-01	-2.3232999E+00#	477	0	0
478	2.2353001E+00	-3.9999999E-02	-3.6622000E+00#	478	0	0
479	2.2353001E+00	-3.9999999E-02	-2.8727500E+00#	479	0	0
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481	2.1149001E+00	-3.3360001E-01	-3.6550000E+00#	481	0	0
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483	2.1149001E+00	-3.3360001E-01	-1.8265001E+00#	483	0	0
484	1.9777000E+00	-6.1119998E-01	-3.6550000E+00#	484	0	0
485	1.9777000E+00	-6.1119998E-01	-2.6074500E+00#	485	0	0
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487	1.9347000E+00	-5.9789997E-01	-1.2650000E+00#	487	0	0
488	1.8654500E+00	-5.7650000E-01	-3.6550000E+00#	488	0	0
489	1.8654500E+00	-5.7650000E-01	-2.5914099E+00#	489	0	0
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491	1.8439500E+00	-5.6985003E-01	-1.2650000E+00#	491	0	0
492	1.7532001E+00	-5.4180002E-01	-3.6550000E+00#	492	0	0
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496	1.7733999E+00	5.6009998E+00	-3.6254001E+00#	496	0	0
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498	1.7733999E+00	5.6009998E+00	-3.3924999E+00#	498	0	0
499	1.8276000E+00	5.2997999E+00	-3.6379001E+00#	499	0	0
500	1.8276000E+00	5.2997999E+00	-3.5151999E+00#	500	0	0
501	1.8276000E+00	5.2997999E+00	-3.3924999E+00#	501	0	0
502	1.9017000E+00	4.9868999E+00	-3.6503999E+00#	502	0	0
503	1.9017000E+00	4.9868999E+00	-3.5214500E+00#	503	0	0
504	1.9017000E+00	4.9868999E+00	-3.3924999E+00#	504	0	0
505	1.9852000E+00	4.6631999E+00	-3.6630001E+00#	505	0	0
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507	1.9852000E+00	4.6631999E+00	-3.3924999E+00#	507	0	0
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509	2.0799999E+00	4.3250999E+00	-3.5339999E+00#	509	0	0
510	2.0799999E+00	4.3250999E+00	-3.3924999E+00#	510	0	0
511	2.2481000E+00	3.9340000E+00	-3.6880000E+00#	511	0	0
512	2.2481000E+00	3.9340000E+00	-3.5299001E+00#	512	0	0
513	2.2481000E+00	3.9340000E+00	-3.3717999E+00#	513	0	0
514	1.0639400E+00	5.7779002E+00	-3.6254001E+00#	514	0	0
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516	1.0639400E+00	5.7779002E+00	-3.3924999E+00#	516	0	0
517	1.2197000E+00	5.4717898E+00	-3.6379001E+00#	517	0	0
518	1.2197000E+00	5.4717898E+00	-3.5151999E+00#	518	0	0
519	1.2197000E+00	5.4717898E+00	-3.3924999E+00#	519	0	0
520	1.3810101E+00	5.1553998E+00	-3.6503999E+00#	520	0	0
521	1.3810101E+00	5.1553998E+00	-3.5214500E+00#	521	0	0
522	1.3810101E+00	5.1553998E+00	-3.3924999E+00#	522	0	0
523	1.5449400E+00	4.8269801E+00	-3.6630001E+00#	523	0	0
524	1.5449400E+00	4.8269801E+00	-3.5277500E+00#	524	0	0
525	1.5449400E+00	4.8269801E+00	-3.3924999E+00#	525	0	0
526	1.7041399E+00	4.4864998E+00	-3.6754999E+00#	526	0	0
527	1.7041399E+00	4.4864998E+00	-3.5339999E+00#	527	0	0
528	1.7041399E+00	4.4864998E+00	-3.3924999E+00#	528	0	0
529	1.8855700E+00	4.1200600E+00	-3.6880000E+00#	529	0	0
530	1.8855700E+00	4.1200600E+00	-3.5299001E+00#	530	0	0
531	1.8855700E+00	4.1200600E+00	-3.3717999E+00#	531	0	0
532	2.0902300E+00	3.7152500E+00	-3.7000000E+00#	532	0	0
533	2.0902300E+00	3.7152700E+00	-3.5256000E+00#	533	0	0
534	2.0902300E+00	3.7153001E+00	-3.3512001E+00#	534	0	0
535	2.2048800E+00	3.3160000E+00	-3.7000000E+00#	535	0	0
536	2.2048800E+00	3.3160000E+00	-3.5048001E+00#	536	0	0
537	2.2048800E+00	3.3160000E+00	-3.3096001E+00#	537	0	0
538	2.2905700E+00	2.9129200E+00	-3.7000000E+00#	538	0	0

539	2.2905700E+00	2.9129200E+00	-3.4731500E+00#	539	0	0
540	2.2905700E+00	2.9129200E+00	-3.2463000E+00#	540	0	0
541	2.3573899E+00	2.4986899E+00	-3.7000000E+00#	541	0	0
542	2.3573899E+00	2.4986899E+00	-3.4307499E+00#	542	0	0
543	2.3573899E+00	2.4986899E+00	-3.1615000E+00#	543	0	0
544	2.4058700E+00	2.0718300E+00	-3.7000000E+00#	544	0	0
545	2.4058700E+00	2.0718300E+00	-3.3748500E+00#	545	0	0
546	2.4058700E+00	2.0718300E+00	-3.0497000E+00#	546	0	0
547	2.4195900E+00	1.6530700E+00	-3.6933000E+00#	547	0	0
548	2.4195900E+00	1.6530700E+00	-3.3004000E+00#	548	0	0
549	2.4195900E+00	1.6530700E+00	-2.9075000E+00#	549	0	0
550	2.4027500E+00	1.2488400E+00	-3.6833000E+00#	550	0	0
551	2.4027500E+00	1.2488400E+00	-3.2081001E+00#	551	0	0
552	2.4027500E+00	1.2488400E+00	-2.7328999E+00#	552	0	0
553	2.3667500E+00	8.7743998E-01	-3.6751001E+00#	553	0	0
554	2.3667500E+00	8.7743998E-01	-3.1070001E+00#	554	0	0
555	2.3667500E+00	8.7743998E-01	-2.5388999E+00#	555	0	0
556	2.3020301E+00	5.3160000E-01	-3.6679001E+00#	556	0	0
557	2.3020301E+00	5.3160000E-01	-2.9956000E+00#	557	0	0
558	2.3020301E+00	5.3160000E-01	-2.3232999E+00#	558	0	0
559	2.2269101E+00	1.9727001E-01	-3.6622000E+00#	559	0	0
560	2.2269101E+00	1.9727001E-01	-2.8727500E+00#	560	0	0
561	2.2269101E+00	1.9727001E-01	-2.0833001E+00#	561	0	0
562	2.1383100E+00	-1.0745000E-01	-3.6550000E+00#	562	0	0
563	2.1383100E+00	-1.0745000E-01	-2.7407501E+00#	563	0	0
564	2.1383100E+00	-1.0745000E-01	-1.8265001E+00#	564	0	0
565	2.0313499E+00	-3.9804000E-01	-3.6550000E+00#	565	0	0
566	2.0313499E+00	-3.9804000E-01	-2.6074500E+00#	566	0	0
567	2.0313499E+00	-3.9804000E-01	-1.5599000E+00#	567	0	0
568	1.9872000E+00	-3.8940001E-01	-1.2650000E+00#	568	0	0
569	1.9160500E+00	-3.7544000E-01	-3.6550000E+00#	569	0	0
570	1.9160500E+00	-3.7544000E-01	-2.5914099E+00#	570	0	0
571	1.9160500E+00	-3.7544000E-01	-1.5274900E+00#	571	0	0
572	1.8939800E+00	-3.7112001E-01	-1.2650000E+00#	572	0	0
573	1.8007500E+00	-3.5284001E-01	-3.6550000E+00#	573	0	0
574	1.8007500E+00	-3.5284001E-01	-2.5750000E+00#	574	0	0
575	1.8007500E+00	-3.5284001E-01	-1.4950000E+00#	575	0	0
576	1.8007500E+00	-3.5284001E-01	-1.2650000E+00#	576	0	0
577	3.3800000E-01	5.8653002E+00	-3.6254001E+00#	577	0	0
578	3.3800000E-01	5.8653002E+00	-3.5089500E+00#	578	0	0
579	3.3800000E-01	5.8653002E+00	-3.3924999E+00#	579	0	0
580	5.9630001E-01	5.5742998E+00	-3.6379001E+00#	580	0	0
581	5.9630001E-01	5.5742998E+00	-3.5151999E+00#	581	0	0
582	5.9630001E-01	5.5742998E+00	-3.3924999E+00#	582	0	0
583	8.4579998E-01	5.2697001E+00	-3.6503999E+00#	583	0	0
584	8.4579998E-01	5.2697001E+00	-3.5214500E+00#	584	0	0
585	8.4579998E-01	5.2697001E+00	-3.3924999E+00#	585	0	0
586	1.0914000E+00	4.9492998E+00	-3.6630001E+00#	586	0	0
587	1.0914000E+00	4.9492998E+00	-3.5277500E+00#	587	0	0
588	1.0914000E+00	4.9492998E+00	-3.3924999E+00#	588	0	0
589	1.3159000E+00	4.6153002E+00	-3.6754999E+00#	589	0	0
590	1.3159000E+00	4.6153002E+00	-3.5339999E+00#	590	0	0
591	1.3159000E+00	4.6153002E+00	-3.3924999E+00#	591	0	0
592	1.5078000E+00	4.2728000E+00	-3.6880000E+00#	592	0	0
593	1.5078000E+00	4.2728000E+00	-3.5299001E+00#	593	0	0
594	1.5078000E+00	4.2728000E+00	-3.3717999E+00#	594	0	0

595	1.6845000E+00	3.9159000E+00	-3.7000000E+00#	595	0	0
596	1.6845000E+00	3.9159501E+00	-3.5256000E+00#	596	0	0
597	1.6845000E+00	3.9159999E+00	-3.3512001E+00#	597	0	0
598	1.8408000E+00	3.5311000E+00	-3.7000000E+00#	598	0	0
599	1.8408000E+00	3.5311000E+00	-3.5048001E+00#	599	0	0
600	1.8408000E+00	3.5311000E+00	-3.3096001E+00#	600	0	0
601	1.9687999E+00	3.1394000E+00	-3.7000000E+00#	601	0	0
602	1.9687999E+00	3.1394000E+00	-3.4731500E+00#	602	0	0
603	1.9687999E+00	3.1394000E+00	-3.2463000E+00#	603	0	0
604	2.0790999E+00	2.7346001E+00	-3.7000000E+00#	604	0	0
605	2.0790999E+00	2.7346001E+00	-3.4307499E+00#	605	0	0
606	2.0790999E+00	2.7346001E+00	-3.1615000E+00#	606	0	0
607	2.1726000E+00	2.3153000E+00	-3.7000000E+00#	607	0	0
608	2.1726000E+00	2.3153000E+00	-3.3748500E+00#	608	0	0
609	2.1726000E+00	2.3153000E+00	-3.0497000E+00#	609	0	0
610	2.2307000E+00	1.9003000E+00	-3.6933000E+00#	610	0	0
611	2.2307000E+00	1.9003000E+00	-3.3004000E+00#	611	0	0
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613	2.2567999E+00	1.4966000E+00	-3.6833000E+00#	613	0	0
614	2.2567999E+00	1.4966000E+00	-3.2081001E+00#	614	0	0
615	2.2567999E+00	1.4966000E+00	-2.7328999E+00#	615	0	0
616	2.2604001E+00	1.1235000E+00	-3.6751001E+00#	616	0	0
617	2.2604001E+00	1.1235000E+00	-3.1070001E+00#	617	0	0
618	2.2604001E+00	1.1235000E+00	-2.5388999E+00#	618	0	0
619	2.2327001E+00	7.7270001E-01	-3.6679001E+00#	619	0	0
620	2.2327001E+00	7.7270001E-01	-2.9956000E+00#	620	0	0
621	2.2327001E+00	7.7270001E-01	-2.3232999E+00#	621	0	0
622	2.1933999E+00	4.3230000E-01	-3.6622000E+00#	622	0	0
623	2.1933999E+00	4.3230000E-01	-2.8727500E+00#	623	0	0
624	2.1933999E+00	4.3230000E-01	-2.0833001E+00#	624	0	0
625	2.1375999E+00	1.1990000E-01	-3.6550000E+00#	625	0	0
626	2.1375999E+00	1.1990000E-01	-2.7407501E+00#	626	0	0
627	2.1375999E+00	1.1990000E-01	-1.8265001E+00#	627	0	0
628	2.0620999E+00	-1.8040000E-01	-3.6550000E+00#	628	0	0
629	2.0620999E+00	-1.8040000E-01	-2.6074500E+00#	629	0	0
630	2.0620999E+00	-1.8040000E-01	-1.5599000E+00#	630	0	0
631	2.0172999E+00	-1.7649999E-01	-1.2650000E+00#	631	0	0
632	1.9450500E+00	-1.7015000E-01	-3.6550000E+00#	632	0	0
633	1.9450400E+00	-1.7015000E-01	-2.5914099E+00#	633	0	0
634	1.9450500E+00	-1.7015000E-01	-1.5274900E+00#	634	0	0
635	1.9226500E+00	-1.6820000E-01	-1.2650000E+00#	635	0	0
636	1.8279999E+00	-1.5989999E-01	-3.6550000E+00#	636	0	0
637	1.8279999E+00	-1.5989999E-01	-2.5750000E+00#	637	0	0
638	1.8279999E+00	-1.5989999E-01	-1.4950000E+00#	638	0	0
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640	2.5610000E-01	5.8694000E+00	-3.6254001E+00#	640	0	0
641	2.5610000E-01	5.8694000E+00	-3.5089500E+00#	641	0	0
642	2.5610000E-01	5.8694000E+00	-3.3924999E+00#	642	0	0
643	3.9309999E-01	5.5922999E+00	-3.6379001E+00#	643	0	0
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645	3.9309999E-01	5.5922999E+00	-3.3924999E+00#	645	0	0
646	5.4769999E-01	5.3090000E+00	-3.6503999E+00#	646	0	0
647	5.4769999E-01	5.3090000E+00	-3.5214500E+00#	647	0	0
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649	7.0999998E-01	5.0181999E+00	-3.6630001E+00#	649	0	0
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651	7.0999998E-01	5.0181999E+00	-3.3924999E+00#	651	0	0
652	8.8419998E-01	4.7171001E+00	-3.6754999E+00#	652	0	0
653	8.8419998E-01	4.7171001E+00	-3.5339999E+00#	653	0	0
654	8.8419998E-01	4.7171001E+00	-3.3924999E+00#	654	0	0
655	1.0891000E+00	4.3982000E+00	-3.6880000E+00#	655	0	0
656	1.0891000E+00	4.3982000E+00	-3.5299001E+00#	656	0	0
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658	1.2752000E+00	4.0676999E+00	-3.7000000E+00#	658	0	0
659	1.2752000E+00	4.0676999E+00	-3.5256000E+00#	659	0	0
660	1.2752000E+00	4.0676999E+00	-3.3512001E+00#	660	0	0
661	1.4476000E+00	3.7097001E+00	-3.7000000E+00#	661	0	0
662	1.4476000E+00	3.7097001E+00	-3.5048001E+00#	662	0	0
663	1.4476000E+00	3.7097001E+00	-3.3096001E+00#	663	0	0
664	1.5994999E+00	3.3427000E+00	-3.7000000E+00#	664	0	0
665	1.5994999E+00	3.3427000E+00	-3.4731500E+00#	665	0	0
666	1.5994999E+00	3.3427000E+00	-3.2463000E+00#	666	0	0
667	1.7394000E+00	2.9623001E+00	-3.7000000E+00#	667	0	0
668	1.7394000E+00	2.9623001E+00	-3.4307499E+00#	668	0	0
669	1.7394000E+00	2.9623001E+00	-3.1615000E+00#	669	0	0
670	1.8430001E+00	2.5854001E+00	-3.7000000E+00#	670	0	0
671	1.8430001E+00	2.5854001E+00	-3.3748500E+00#	671	0	0
672	1.8430001E+00	2.5854001E+00	-3.0497000E+00#	672	0	0
673	1.9329000E+00	2.2025001E+00	-3.6933000E+00#	673	0	0
674	1.9329000E+00	2.2025001E+00	-3.3004000E+00#	674	0	0
675	1.9329000E+00	2.2025001E+00	-2.9075000E+00#	675	0	0
676	2.0007999E+00	1.8247000E+00	-3.6833000E+00#	676	0	0
677	2.0007999E+00	1.8247000E+00	-3.2081001E+00#	677	0	0
678	2.0007999E+00	1.8247000E+00	-2.7328999E+00#	678	0	0
679	2.0409999E+00	1.4852000E+00	-3.6751001E+00#	679	0	0
680	2.0409999E+00	1.4852000E+00	-3.1070001E+00#	680	0	0
681	2.0409999E+00	1.4852000E+00	-2.5388999E+00#	681	0	0
682	2.0713000E+00	1.1365000E+00	-3.6679001E+00#	682	0	0
683	2.0713000E+00	1.1365000E+00	-2.9956000E+00#	683	0	0
684	2.0713000E+00	1.1365000E+00	-2.3232999E+00#	684	0	0
685	2.0868001E+00	8.0199999E-01	-3.6622000E+00#	685	0	0
686	2.0868001E+00	8.0199999E-01	-2.8727500E+00#	686	0	0
687	2.0868001E+00	8.0199999E-01	-2.0833001E+00#	687	0	0
688	2.0969000E+00	4.3230000E-01	-3.6580000E+00#	688	0	0
689	2.0969000E+00	4.3230000E-01	-2.7422500E+00#	689	0	0
690	2.0969000E+00	4.3230000E-01	-1.8265001E+00#	690	0	0
691	2.0680001E+00	0.0000000E+00	-3.6550000E+00#	691	0	0
692	2.0680001E+00	0.0000000E+00	-2.6074500E+00#	692	0	0
693	2.0680001E+00	0.0000000E+00	-1.5599000E+00#	693	0	0
694	2.0250001E+00	0.0000000E+00	-1.2650000E+00#	694	0	0
695	1.9515001E+00	0.0000000E+00	-3.6550000E+00#	695	0	0
696	1.9514900E+00	0.0000000E+00	-2.5914099E+00#	696	0	0
697	1.9515001E+00	0.0000000E+00	-1.5274900E+00#	697	0	0
698	1.9299999E+00	0.0000000E+00	-1.2650000E+00#	698	0	0
699	1.8350000E+00	0.0000000E+00	-3.6550000E+00#	699	0	0
700	1.8350000E+00	0.0000000E+00	-2.5750000E+00#	700	0	0
701	1.8350000E+00	0.0000000E+00	-1.4950000E+00#	701	0	0
702	1.8350000E+00	0.0000000E+00	-1.2650000E+00#	702	0	0
703	5.3102999E+00	2.5132999E+00	-2.8492000E+00#	703	0	0
704	5.3103499E+00	2.5131500E+00	-2.7841001E+00#	704	0	0
705	5.3104000E+00	2.5130000E+00	-2.7190001E+00#	705	0	0
706	5.2154999E+00	2.2516000E+00	-2.8369000E+00#	706	0	0

707	5.2022500E+00	2.2179699E+00	-2.7698500E+00#	707	0	0
708	5.1887999E+00	2.1845000E+00	-2.7028000E+00#	708	0	0
709	5.1115999E+00	1.9940000E+00	-2.8213999E+00#	709	0	0
710	5.0863500E+00	1.9318900E+00	-2.7518001E+00#	710	0	0
711	5.0604000E+00	1.8704000E+00	-2.6822000E+00#	711	0	0
712	5.0016999E+00	1.7320000E+00	-2.8023000E+00#	712	0	0
713	4.9657402E+00	1.6465200E+00	-2.7296500E+00#	713	0	0
714	4.9284000E+00	1.5623000E+00	-2.6570001E+00#	714	0	0
715	4.8855000E+00	1.4632000E+00	-2.7787001E+00#	715	0	0
716	4.8411598E+00	1.3566300E+00	-2.7017500E+00#	716	0	0
717	4.7946000E+00	1.2521000E+00	-2.6248000E+00#	717	0	0
718	4.7638001E+00	1.1796000E+00	-2.7484000E+00#	718	0	0
719	4.7125502E+00	1.0559100E+00	-2.6659000E+00#	719	0	0
720	4.6581998E+00	9.3510002E-01	-2.5834000E+00#	720	0	0
721	4.6339998E+00	8.8110000E-01	-2.7090001E+00#	721	0	0
722	4.5757399E+00	7.5445998E-01	-2.6203499E+00#	722	0	0
723	4.5141001E+00	6.3120002E-01	-2.5316999E+00#	723	0	0
724	4.5141001E+00	6.3120002E-01	-2.6672001E+00#	724	0	0
725	4.4520798E+00	5.1056999E-01	-2.5750999E+00#	725	0	0
726	4.3868999E+00	3.9340001E-01	-2.4830000E+00#	726	0	0
727	4.3333001E+00	2.9929999E-01	-2.5997000E+00#	727	0	0
728	4.2894802E+00	2.2210000E-01	-2.5122499E+00#	728	0	0
729	4.2442999E+00	1.4650001E-01	-2.4247999E+00#	729	0	0
730	4.1619000E+00	3.4000000E-03	-2.5301001E+00#	730	0	0
731	4.1237898E+00	-6.7000002E-02	-2.4412999E+00#	731	0	0
732	4.0844998E+00	-1.3609999E-01	-2.3525000E+00#	732	0	0
733	3.9716001E+00	-3.3260000E-01	-2.4480000E+00#	733	0	0
734	3.9347701E+00	-3.9087999E-01	-2.3592000E+00#	734	0	0
735	3.8971000E+00	-4.4810000E-01	-2.2704000E+00#	735	0	0
736	3.7591000E+00	-6.4170003E-01	-2.3571000E+00#	736	0	0
737	3.7251301E+00	-6.8774998E-01	-2.2613001E+00#	737	0	0
738	3.6905999E+00	-7.3299998E-01	-2.1654999E+00#	738	0	0
739	3.4454000E+00	-1.0539000E+00	-2.2084999E+00#	739	0	0
740	3.4454000E+00	-1.0539500E+00	-2.1268499E+00#	740	0	0
741	3.4454000E+00	-1.0540000E+00	-2.0452001E+00#	741	0	0
742	3.5436001E+00	-9.2580003E-01	-2.0160000E+00#	742	0	0
743	3.6729000E+00	-7.5639999E-01	-2.0160000E+00#	743	0	0
744	3.2562001E+00	-1.2796000E+00	-2.1285000E+00#	744	0	0
745	3.2910800E+00	-1.2310500E+00	-2.0135000E+00#	745	0	0
746	3.3252499E+00	-1.1817000E+00	-1.8985000E+00#	746	0	0
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748	3.6729000E+00	-7.5639999E-01	-1.9710000E+00#	748	0	0
749	2.9449000E+00	-1.6098000E+00	-1.9960999E+00#	749	0	0
750	3.0270901E+00	-1.5255600E+00	-1.9110500E+00#	750	0	0
751	3.1069000E+00	-1.4376000E+00	-1.8260000E+00#	751	0	0
752	3.3282001E+00	-1.1988000E+00	-1.8260000E+00#	752	0	0
753	3.4828000E+00	-1.0053999E+00	-1.8260000E+00#	753	0	0
754	2.5955000E+00	-1.9372000E+00	-1.8420000E+00#	754	0	0
755	2.8347299E+00	-1.7240500E+00	-1.7752500E+00#	755	0	0
756	3.0562999E+00	-1.4826500E+00	-1.7085000E+00#	756	0	0
757	3.3282001E+00	-1.1988000E+00	-1.7810000E+00#	757	0	0
758	3.4828000E+00	-1.0053999E+00	-1.7810000E+00#	758	0	0
759	2.2077999E+00	-2.2748001E+00	-1.6596000E+00#	759	0	0
760	2.5086801E+00	-2.0405099E+00	-1.6478000E+00#	760	0	0
761	2.7844000E+00	-1.7665000E+00	-1.6360000E+00#	761	0	0
762	3.0829999E+00	-1.4630001E+00	-1.6360000E+00#	762	0	0

763	3.2588000E+00	-1.2768000E+00	-1.6360000E+00#	763	0	0
764	2.2077999E+00	-2.2748001E+00	-1.4650000E+00#	764	0	0
765	2.5086801E+00	-2.0405099E+00	-1.5050000E+00#	765	0	0
766	2.7844000E+00	-1.7665000E+00	-1.5450000E+00#	766	0	0
767	3.0829999E+00	-1.4630001E+00	-1.5910000E+00#	767	0	0
768	3.2588000E+00	-1.2768000E+00	-1.5910000E+00#	768	0	0
769	2.4101000E+00	-2.1027999E+00	-1.4006000E+00#	769	0	0
770	2.6025200E+00	-1.9432800E+00	-1.4253000E+00#	770	0	0
771	2.7844000E+00	-1.7665000E+00	-1.4500000E+00#	771	0	0
772	2.9935999E+00	-1.5585001E+00	-1.4500000E+00#	772	0	0
773	2.7179999E+00	-1.8270000E+00	-1.3650000E+00#	773	0	0
774	2.8098700E+00	-1.7375000E+00	-1.3783300E+00#	774	0	0
775	2.9017301E+00	-1.6480000E+00	-1.3916700E+00#	775	0	0
776	2.9935999E+00	-1.5585001E+00	-1.4050000E+00#	776	0	0
777	4.9672298E+00	3.1372399E+00	-2.8492000E+00#	777	0	0
778	4.9672599E+00	3.1371701E+00	-2.7841001E+00#	778	0	0
779	4.9672999E+00	3.1371000E+00	-2.7190001E+00#	779	0	0
780	4.9295702E+00	2.7955799E+00	-2.8359001E+00#	780	0	0
781	4.9241900E+00	2.7672200E+00	-2.7693501E+00#	781	0	0
782	4.9186602E+00	2.7389400E+00	-2.7028000E+00#	782	0	0
783	4.8739500E+00	2.4596701E+00	-2.8189001E+00#	783	0	0
784	4.8630700E+00	2.4094100E+00	-2.7505500E+00#	784	0	0
785	4.8517098E+00	2.3594601E+00	-2.6822000E+00#	785	0	0
786	4.8063302E+00	2.1178100E+00	-2.7976501E+00#	786	0	0
787	4.7876201E+00	2.0579300E+00	-2.7273200E+00#	787	0	0
788	4.7682199E+00	1.9985700E+00	-2.6570001E+00#	788	0	0
789	4.7078900E+00	1.8150700E+00	-2.7707000E+00#	789	0	0
790	4.6853199E+00	1.7472900E+00	-2.6977501E+00#	790	0	0
791	4.6618199E+00	1.6802300E+00	-2.6248000E+00#	791	0	0
792	4.5970702E+00	1.5154700E+00	-2.7350500E+00#	792	0	0
793	4.5730100E+00	1.4447500E+00	-2.6592200E+00#	793	0	0
794	4.5479102E+00	1.3748600E+00	-2.5834000E+00#	794	0	0
795	4.4678702E+00	1.2429100E+00	-2.6881001E+00#	795	0	0
796	4.4443202E+00	1.1779400E+00	-2.6099000E+00#	796	0	0
797	4.4198599E+00	1.1137300E+00	-2.5316999E+00#	797	0	0
798	4.3883700E+00	1.0314300E+00	-2.6521499E+00#	798	0	0
799	4.3544898E+00	9.4678998E-01	-2.5675700E+00#	799	0	0
800	4.3190198E+00	8.6356997E-01	-2.4830000E+00#	800	0	0
801	4.2758298E+00	7.6429999E-01	-2.5997000E+00#	801	0	0
802	4.2405801E+00	6.8282998E-01	-2.5122499E+00#	802	0	0
803	4.2038102E+00	6.0281003E-01	-2.4247999E+00#	803	0	0
804	4.1373200E+00	4.5168000E-01	-2.5301001E+00#	804	0	0
805	4.1070199E+00	3.7757000E-01	-2.4412999E+00#	805	0	0
806	4.0754099E+00	3.0462000E-01	-2.3525000E+00#	806	0	0
807	3.9842801E+00	9.7120002E-02	-2.4480000E+00#	807	0	0
808	3.9539800E+00	3.5200000E-02	-2.3592000E+00#	808	0	0
809	3.9227200E+00	-2.5750000E-02	-2.2704000E+00#	809	0	0
810	3.8063400E+00	-2.3311000E-01	-2.3571000E+00#	810	0	0
811	3.7775400E+00	-2.8253001E-01	-2.2613001E+00#	811	0	0
812	3.7481000E+00	-3.3123001E-01	-2.1654999E+00#	812	0	0
813	3.5388899E+00	-6.7668998E-01	-2.2084999E+00#	813	0	0
814	3.5388899E+00	-6.7671001E-01	-2.1268499E+00#	814	0	0
815	3.5388899E+00	-6.7673999E-01	-2.0452001E+00#	815	0	0
816	3.6226799E+00	-5.3873003E-01	-2.0160000E+00#	816	0	0
817	3.7330201E+00	-3.5637000E-01	-2.0160000E+00#	817	0	0
818	3.3750899E+00	-9.2141002E-01	-2.1285000E+00#	818	0	0

819	3.4045300E+00	-8.6939001E-01	-2.0135000E+00#	819	0	0
820	3.4331701E+00	-8.1664997E-01	-1.8985000E+00#	820	0	0
821	3.6226799E+00	-5.3873003E-01	-1.9710000E+00#	821	0	0
822	3.7330201E+00	-3.5637000E-01	-1.9710000E+00#	822	0	0
823	3.1011400E+00	-1.2832100E+00	-1.9960999E+00#	823	0	0
824	3.1737900E+00	-1.1906101E+00	-1.9110500E+00#	824	0	0
825	3.2436700E+00	-1.0945700E+00	-1.8260000E+00#	825	0	0
826	3.4379499E+00	-8.3335000E-01	-1.8260000E+00#	826	0	0
827	3.5708201E+00	-6.2443000E-01	-1.8260000E+00#	827	0	0
828	2.7890699E+00	-1.6463799E+00	-1.8420000E+00#	828	0	0
829	3.0039401E+00	-1.4087000E+00	-1.7752500E+00#	829	0	0
830	3.1982100E+00	-1.1448300E+00	-1.7085000E+00#	830	0	0
831	3.4379499E+00	-8.3335000E-01	-1.7810000E+00#	831	0	0
832	3.5708201E+00	-6.2443000E-01	-1.7810000E+00#	832	0	0
833	2.4621601E+00	-1.9966600E+00	-1.6596000E+00#	833	0	0
834	2.7235200E+00	-1.7434100E+00	-1.6478000E+00#	834	0	0
835	2.9584601E+00	-1.4563200E+00	-1.6360000E+00#	835	0	0
836	3.2226501E+00	-1.1224300E+00	-1.6360000E+00#	836	0	0
837	3.3773501E+00	-9.1834003E-01	-1.6360000E+00#	837	0	0
838	2.4621601E+00	-1.9966600E+00	-1.4650000E+00#	838	0	0
839	2.7235200E+00	-1.7434100E+00	-1.5050000E+00#	839	0	0
840	2.9584601E+00	-1.4563200E+00	-1.5450000E+00#	840	0	0
841	3.2226501E+00	-1.1224300E+00	-1.5910000E+00#	841	0	0
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843	2.6225500E+00	-1.8310000E+00	-1.4006000E+00#	843	0	0
844	2.7966800E+00	-1.6516700E+00	-1.4253000E+00#	844	0	0
845	2.9584601E+00	-1.4563200E+00	-1.4500000E+00#	845	0	0
846	3.1440401E+00	-1.2270401E+00	-1.4500000E+00#	846	0	0
847	2.8989699E+00	-1.5236100E+00	-1.3650000E+00#	847	0	0
848	2.9806600E+00	-1.4247500E+00	-1.3783300E+00#	848	0	0
849	3.0623500E+00	-1.3259000E+00	-1.3916700E+00#	849	0	0
850	3.1440401E+00	-1.2270401E+00	-1.4050000E+00#	850	0	0
851	4.5511999E+00	3.7151000E+00	-2.8492000E+00#	851	0	0
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853	4.5511999E+00	3.7151000E+00	-2.7190001E+00#	853	0	0
854	4.5872998E+00	3.3041999E+00	-2.8348999E+00#	854	0	0
855	4.5884500E+00	3.2823400E+00	-2.7688501E+00#	855	0	0
856	4.5895000E+00	3.2605000E+00	-2.7028000E+00#	856	0	0
857	4.5942998E+00	2.8982999E+00	-2.8164001E+00#	857	0	0
858	4.5952301E+00	2.8619101E+00	-2.7493000E+00#	858	0	0
859	4.5959001E+00	2.8255999E+00	-2.6822000E+00#	859	0	0
860	4.5816002E+00	2.4834001E+00	-2.7930000E+00#	860	0	0
861	4.5756502E+00	2.4509900E+00	-2.7249999E+00#	861	0	0
862	4.5695000E+00	2.4187000E+00	-2.6570001E+00#	862	0	0
863	4.5054002E+00	2.1484001E+00	-2.7627001E+00#	863	0	0
864	4.4982200E+00	2.1214499E+00	-2.6937499E+00#	864	0	0
865	4.4909000E+00	2.0946000E+00	-2.6248000E+00#	865	0	0
866	4.4071999E+00	1.8329999E+00	-2.7217000E+00#	866	0	0
867	4.4017301E+00	1.8175300E+00	-2.6525500E+00#	867	0	0
868	4.3962002E+00	1.8020999E+00	-2.5834000E+00#	868	0	0
869	4.2742000E+00	1.5833000E+00	-2.6672001E+00#	869	0	0
870	4.2742000E+00	1.5833000E+00	-2.5994501E+00#	870	0	0
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872	4.2277002E+00	1.4140000E+00	-2.6371000E+00#	872	0	0
873	4.2145300E+00	1.3686800E+00	-2.5600500E+00#	873	0	0
874	4.2009001E+00	1.3237000E+00	-2.4830000E+00#	874	0	0

875	4.1686001E+00	1.2204000E+00	-2.5997000E+00#	875	0	0
876	4.1423302E+00	1.1356100E+00	-2.5122499E+00#	876	0	0
877	4.1143999E+00	1.0520999E+00	-2.4247999E+00#	877	0	0
878	4.0646000E+00	8.9469999E-01	-2.5301001E+00#	878	0	0
879	4.0424700E+00	8.1774002E-01	-2.4412999E+00#	879	0	0
880	4.0188999E+00	7.4180001E-01	-2.3525000E+00#	880	0	0
881	3.9505999E+00	5.2569997E-01	-2.4480000E+00#	881	0	0
882	3.9271801E+00	4.6087000E-01	-2.3592000E+00#	882	0	0
883	3.9026999E+00	3.9690000E-01	-2.2704000E+00#	883	0	0
884	3.8092999E+00	1.7820001E-01	-2.3571000E+00#	884	0	0
885	3.7860100E+00	1.2597001E-01	-2.2613001E+00#	885	0	0
886	3.7620001E+00	7.4400000E-02	-2.1654999E+00#	886	0	0
887	3.5912001E+00	-2.9159999E-01	-2.2084999E+00#	887	0	0
888	3.5912001E+00	-2.9159999E-01	-2.1268499E+00#	888	0	0
889	3.5912001E+00	-2.9159999E-01	-2.0452001E+00#	889	0	0
890	3.6596000E+00	-1.4540000E-01	-2.0160000E+00#	890	0	0
891	3.7497001E+00	4.7800001E-02	-2.0160000E+00#	891	0	0
892	3.4547000E+00	-5.5250001E-01	-2.1285000E+00#	892	0	0
893	3.4783599E+00	-4.9761999E-01	-2.0135000E+00#	893	0	0
894	3.5011499E+00	-4.4209999E-01	-1.8985000E+00#	894	0	0
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896	3.7497001E+00	4.7800001E-02	-1.9710000E+00#	896	0	0
897	3.2212999E+00	-9.4169998E-01	-1.9960999E+00#	897	0	0
898	3.2835600E+00	-8.4180999E-01	-1.9110500E+00#	898	0	0
899	3.3427000E+00	-7.3879999E-01	-1.8260000E+00#	899	0	0
900	3.5077000E+00	-4.5820001E-01	-1.8260000E+00#	900	0	0
901	3.6173000E+00	-2.3620000E-01	-1.8260000E+00#	901	0	0
902	2.9502001E+00	-1.3364000E+00	-1.8420000E+00#	902	0	0
903	3.1382000E+00	-1.0769600E+00	-1.7752500E+00#	903	0	0
904	3.3029001E+00	-7.9369998E-01	-1.7085000E+00#	904	0	0
905	3.5077000E+00	-4.5820001E-01	-1.7810000E+00#	905	0	0
906	3.6173000E+00	-2.3620000E-01	-1.7810000E+00#	906	0	0
907	2.6817000E+00	-1.6903000E+00	-1.6596000E+00#	907	0	0
908	2.9033501E+00	-1.4238900E+00	-1.6478000E+00#	908	0	0
909	3.0980999E+00	-1.1292000E+00	-1.6360000E+00#	909	0	0
910	3.3248000E+00	-7.6880002E-01	-1.6360000E+00#	910	0	0
911	3.4566000E+00	-5.4920000E-01	-1.6360000E+00#	911	0	0
912	2.6817000E+00	-1.6903000E+00	-1.4650000E+00#	912	0	0
913	2.9033501E+00	-1.4238900E+00	-1.5050000E+00#	913	0	0
914	3.0980999E+00	-1.1292000E+00	-1.5450000E+00#	914	0	0
915	3.3248000E+00	-7.6880002E-01	-1.5910000E+00#	915	0	0
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917	2.8045001E+00	-1.5379000E+00	-1.4006000E+00#	917	0	0
918	2.9583001E+00	-1.3408500E+00	-1.4253000E+00#	918	0	0
919	3.0980999E+00	-1.1292000E+00	-1.4500000E+00#	919	0	0
920	3.2579000E+00	-8.8129997E-01	-1.4500000E+00#	920	0	0
921	3.0462000E+00	-1.2025000E+00	-1.3650000E+00#	921	0	0
922	3.1167700E+00	-1.0954300E+00	-1.3783300E+00#	922	0	0
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924	3.2579000E+00	-8.8129997E-01	-1.4050000E+00#	924	0	0
925	4.4713001E+00	3.8110001E+00	-2.8492000E+00#	925	0	0
926	4.4784002E+00	3.8025501E+00	-2.7841001E+00#	926	0	0
927	4.4854999E+00	3.7941000E+00	-2.7190001E+00#	927	0	0
928	4.4475999E+00	3.4899001E+00	-2.8348999E+00#	928	0	0
929	4.4456201E+00	3.4733400E+00	-2.7688501E+00#	929	0	0
930	4.4436002E+00	3.4568000E+00	-2.7028000E+00#	930	0	0

931	4.4095998E+00	3.1724000E+00	-2.8164001E+00#	931	0	0
932	4.4064698E+00	3.1448700E+00	-2.7493000E+00#	932	0	0
933	4.4032001E+00	3.1173999E+00	-2.6822000E+00#	933	0	0
934	4.3709998E+00	2.8376000E+00	-2.7930000E+00#	934	0	0
935	4.3674102E+00	2.8052001E+00	-2.7249999E+00#	935	0	0
936	4.3635998E+00	2.7729001E+00	-2.6570001E+00#	936	0	0
937	4.3295999E+00	2.4837000E+00	-2.7627001E+00#	937	0	0
938	4.3258400E+00	2.4539499E+00	-2.6937499E+00#	938	0	0
939	4.3218999E+00	2.4243000E+00	-2.6248000E+00#	939	0	0
940	4.2863998E+00	2.1001000E+00	-2.7217000E+00#	940	0	0
941	4.2845502E+00	2.0787799E+00	-2.6525500E+00#	941	0	0
942	4.2825999E+00	2.0574999E+00	-2.5834000E+00#	942	0	0
943	3.9820800E+00	4.3196201E+00	-2.8492000E+00#	943	0	0
944	3.9861100E+00	4.3158498E+00	-2.7841001E+00#	944	0	0
945	3.9901500E+00	4.3120899E+00	-2.7190001E+00#	945	0	0
946	4.0337100E+00	3.9805300E+00	-2.8359001E+00#	946	0	0
947	4.0381999E+00	3.9493999E+00	-2.7693501E+00#	947	0	0
948	4.0424900E+00	3.9183099E+00	-2.7028000E+00#	948	0	0
949	4.0599999E+00	3.6499600E+00	-2.8189001E+00#	949	0	0
950	4.0660801E+00	3.5947199E+00	-2.7505500E+00#	950	0	0
951	4.0715098E+00	3.5396299E+00	-2.6822000E+00#	951	0	0
952	4.0803900E+00	3.3069201E+00	-2.7976501E+00#	952	0	0
953	4.0825500E+00	3.2386401E+00	-2.7273200E+00#	953	0	0
954	4.0837202E+00	3.1706800E+00	-2.6570001E+00#	954	0	0
955	4.0881901E+00	2.9572401E+00	-2.7707000E+00#	955	0	0
956	4.0874100E+00	2.8806601E+00	-2.6977501E+00#	956	0	0
957	4.0853801E+00	2.8045499E+00	-2.6248000E+00#	957	0	0
958	4.0819702E+00	2.6013701E+00	-2.7350500E+00#	958	0	0
959	4.0786700E+00	2.5227399E+00	-2.6592200E+00#	959	0	0
960	4.0739999E+00	2.4446700E+00	-2.5834000E+00#	960	0	0
961	4.0949001E+00	2.1768000E+00	-2.6881001E+00#	961	0	0
962	4.0869699E+00	2.1062200E+00	-2.6099000E+00#	962	0	0
963	4.0779099E+00	2.0361900E+00	-2.5316999E+00#	963	0	0
964	4.0648198E+00	1.9490499E+00	-2.6521499E+00#	964	0	0
965	4.0518599E+00	1.8548200E+00	-2.5675700E+00#	965	0	0
966	4.0368600E+00	1.7616800E+00	-2.4830000E+00#	966	0	0
967	4.0174999E+00	1.6512700E+00	-2.5997000E+00#	967	0	0
968	4.0013599E+00	1.5613101E+00	-2.5122499E+00#	968	0	0
969	3.9833100E+00	1.4724700E+00	-2.4247999E+00#	969	0	0
970	3.9509699E+00	1.3081400E+00	-2.5301001E+00#	970	0	0
971	3.9367199E+00	1.2298400E+00	-2.4412999E+00#	971	0	0
972	3.9209700E+00	1.1524000E+00	-2.3525000E+00#	972	0	0
973	3.8742700E+00	9.3474001E-01	-2.4480000E+00#	973	0	0
974	3.8575599E+00	8.6861002E-01	-2.3592000E+00#	974	0	0
975	3.8397400E+00	8.0321002E-01	-2.2704000E+00#	975	0	0
976	3.7694800E+00	5.7760000E-01	-2.3571000E+00#	976	0	0
977	3.7515399E+00	5.2509999E-01	-2.2613001E+00#	977	0	0
978	3.7328701E+00	4.7317001E-01	-2.1654999E+00#	978	0	0
979	3.5985401E+00	1.7964000E-01	-2.2084999E+00#	979	0	0
980	3.5985401E+00	1.7964000E-01	-2.1268499E+00#	980	0	0
981	3.5985401E+00	1.7964000E-01	-2.0452001E+00#	981	0	0
982	3.6472499E+00	3.3351001E-01	-2.0160000E+00#	982	0	0
983	3.7114000E+00	5.3679001E-01	-2.0160000E+00#	983	0	0
984	3.4972701E+00	-9.6830003E-02	-2.1285000E+00#	984	0	0
985	3.5135500E+00	-3.9340001E-02	-2.0135000E+00#	985	0	0
986	3.5288899E+00	1.8660000E-02	-1.8985000E+00#	986	0	0

987	3.6472499E+00	3.3351001E-01	-1.9710000E+00#	987	0	0
988	3.7114000E+00	5.3679001E-01	-1.9710000E+00#	988	0	0
989	3.3166699E+00	-5.1318997E-01	-1.9960999E+00#	989	0	0
990	3.3653500E+00	-4.0603000E-01	-1.9110500E+00#	990	0	0
991	3.4105301E+00	-2.9618001E-01	-1.8260000E+00#	991	0	0
992	3.5375199E+00	3.5800000E-03	-1.8260000E+00#	992	0	0
993	3.6171999E+00	2.3797999E-01	-1.8260000E+00#	993	0	0
994	3.0993700E+00	-9.3989003E-01	-1.8420000E+00#	994	0	0
995	3.2519100E+00	-6.5811998E-01	-1.7752500E+00#	995	0	0
996	3.3782499E+00	-3.5576999E-01	-1.7085000E+00#	996	0	0
997	3.5375199E+00	3.5800000E-03	-1.7810000E+00#	997	0	0
998	3.6171999E+00	2.3797999E-01	-1.7810000E+00#	998	0	0
999	2.8776801E+00	-1.3296000E+00	-1.6596000E+00#	999	0	0
1000	3.0637100E+00	-1.0347500E+00	-1.6478000E+00#	1000	0	0
1001	3.2189901E+00	-7.1512002E-01	-1.6360000E+00#	1001	0	0
1002	3.3967099E+00	-3.2821000E-01	-1.6360000E+00#	1002	0	0
1003	3.4987299E+00	-9.3350001E-02	-1.6360000E+00#	1003	0	0
1004	2.8776801E+00	-1.3296000E+00	-1.4650000E+00#	1004	0	0
1005	3.0637100E+00	-1.0347500E+00	-1.5050000E+00#	1005	0	0
1006	3.2189901E+00	-7.1512002E-01	-1.5450000E+00#	1006	0	0
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1008	3.4987299E+00	-9.3350001E-02	-1.5910000E+00#	1008	0	0
1009	2.9812601E+00	-1.1586601E+00	-1.4006000E+00#	1009	0	0
1010	3.1080101E+00	-9.4321001E-01	-1.4253000E+00#	1010	0	0
1011	3.2189901E+00	-7.1512002E-01	-1.4500000E+00#	1011	0	0
1012	3.3450699E+00	-4.4848999E-01	-1.4500000E+00#	1012	0	0
1013	3.1771300E+00	-7.9460001E-01	-1.3650000E+00#	1013	0	0
1014	3.2331100E+00	-6.7922997E-01	-1.3783300E+00#	1014	0	0
1015	3.2890899E+00	-5.6386000E-01	-1.3916700E+00#	1015	0	0
1016	3.3450699E+00	-4.4848999E-01	-1.4050000E+00#	1016	0	0
1017	3.4354000E+00	4.7659001E+00	-2.8492000E+00#	1017	0	0
1018	3.4354000E+00	4.7659001E+00	-2.7841001E+00#	1018	0	0
1019	3.4354000E+00	4.7659001E+00	-2.7190001E+00#	1019	0	0
1020	3.5658000E+00	4.4222002E+00	-2.8369000E+00#	1020	0	0
1021	3.5799699E+00	4.3778901E+00	-2.7698500E+00#	1021	0	0
1022	3.5936999E+00	4.3336000E+00	-2.7028000E+00#	1022	0	0
1023	3.6586001E+00	4.0889001E+00	-2.8213999E+00#	1023	0	0
1024	3.6797900E+00	4.0077801E+00	-2.7518001E+00#	1024	0	0
1025	3.6995001E+00	3.9268000E+00	-2.6822000E+00#	1025	0	0
1026	3.7392001E+00	3.7463000E+00	-2.8023000E+00#	1026	0	0
1027	3.7546201E+00	3.6431100E+00	-2.7296500E+00#	1027	0	0
1028	3.7677000E+00	3.5404000E+00	-2.6570001E+00#	1028	0	0
1029	3.7946999E+00	3.4072001E+00	-2.7787001E+00#	1029	0	0
1030	3.8067801E+00	3.2841101E+00	-2.7017500E+00#	1030	0	0
1031	3.8155000E+00	3.1619000E+00	-2.6248000E+00#	1031	0	0
1032	3.8185000E+00	3.0827999E+00	-2.7484000E+00#	1032	0	0
1033	3.8266201E+00	2.9461999E+00	-2.6659000E+00#	1033	0	0
1034	3.8304999E+00	2.8109000E+00	-2.5834000E+00#	1034	0	0
1035	3.8324001E+00	2.7500999E+00	-2.7090001E+00#	1035	0	0
1036	3.8354900E+00	2.6068201E+00	-2.6203499E+00#	1036	0	0
1037	3.8338001E+00	2.4651999E+00	-2.5316999E+00#	1037	0	0
1038	3.8338001E+00	2.4651999E+00	-2.6672001E+00#	1038	0	0
1039	3.8329999E+00	2.3215699E+00	-2.5750999E+00#	1039	0	0
1040	3.8273001E+00	2.1798000E+00	-2.4830000E+00#	1040	0	0
1041	3.8220000E+00	2.0639000E+00	-2.5997000E+00#	1041	0	0
1042	3.8167801E+00	1.9699900E+00	-2.5122499E+00#	1042	0	0

1043	3.8094001E+00	1.8770000E+00	-2.4247999E+00#	1043	0	0
1044	3.7953999E+00	1.7077000E+00	-2.5301001E+00#	1044	0	0
1045	3.7890799E+00	1.6288500E+00	-2.4412999E+00#	1045	0	0
1046	3.7811999E+00	1.5506999E+00	-2.3525000E+00#	1046	0	0
1047	3.7557001E+00	1.3336000E+00	-2.4480000E+00#	1047	0	0
1048	3.7457299E+00	1.2668500E+00	-2.3592000E+00#	1048	0	0
1049	3.7346001E+00	1.2007000E+00	-2.2704000E+00#	1049	0	0
1050	3.6879001E+00	9.7060001E-01	-2.3571000E+00#	1050	0	0
1051	3.6751101E+00	9.1835999E-01	-2.2613001E+00#	1051	0	0
1052	3.6616001E+00	8.6659998E-01	-2.1654999E+00#	1052	0	0
1053	3.5443001E+00	6.4780003E-01	-2.2084999E+00#	1053	0	0
1054	3.5443001E+00	6.4780003E-01	-2.1268499E+00#	1054	0	0
1055	3.5443001E+00	6.4780003E-01	-2.0452001E+00#	1055	0	0
1056	3.5725000E+00	8.0669999E-01	-2.0160000E+00#	1056	0	0
1057	3.6096001E+00	1.0166000E+00	-2.0160000E+00#	1057	0	0
1058	3.4800000E+00	3.6050001E-01	-2.1285000E+00#	1058	0	0
1059	3.4886301E+00	4.1960999E-01	-2.0135000E+00#	1059	0	0
1060	3.4962499E+00	4.7909999E-01	-1.8985000E+00#	1060	0	0
1061	3.5725000E+00	8.0669999E-01	-1.9710000E+00#	1061	0	0
1062	3.6096001E+00	1.0166000E+00	-1.9710000E+00#	1062	0	0
1063	3.3552999E+00	-7.5900003E-02	-1.9960999E+00#	1063	0	0
1064	3.3895600E+00	3.6699999E-02	-1.9110500E+00#	1064	0	0
1065	3.4200001E+00	1.5150000E-01	-1.8260000E+00#	1065	0	0
1066	3.5067999E+00	4.6529999E-01	-1.8260000E+00#	1066	0	0
1067	3.5552001E+00	7.0810002E-01	-1.8260000E+00#	1067	0	0
1068	3.1954999E+00	-5.2730000E-01	-1.8420000E+00#	1068	0	0
1069	3.3099899E+00	-2.2802000E-01	-1.7752500E+00#	1069	0	0
1070	3.3958001E+00	8.8249996E-02	-1.7085000E+00#	1070	0	0
1071	3.5067999E+00	4.6529999E-01	-1.7810000E+00#	1071	0	0
1072	3.5552001E+00	7.0810002E-01	-1.7810000E+00#	1072	0	0
1073	3.0253999E+00	-9.4660002E-01	-1.6596000E+00#	1073	0	0
1074	3.1721699E+00	-6.2807000E-01	-1.6478000E+00#	1074	0	0
1075	3.2848001E+00	-2.8880000E-01	-1.6360000E+00#	1075	0	0
1076	3.4105000E+00	1.1800000E-01	-1.6360000E+00#	1076	0	0
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1083	3.1070001E+00	-7.5959998E-01	-1.4006000E+00#	1083	0	0
1084	3.2045500E+00	-5.2943999E-01	-1.4253000E+00#	1084	0	0
1085	3.2848001E+00	-2.8880000E-01	-1.4500000E+00#	1085	0	0
1086	3.3750000E+00	-8.0000004E-03	-1.4500000E+00#	1086	0	0
1087	3.2537000E+00	-3.7310001E-01	-1.3650000E+00#	1087	0	0
1088	3.2941301E+00	-2.5139999E-01	-1.3783300E+00#	1088	0	0
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1091	3.3334999E+00	4.8376999E+00	-2.8492000E+00#	1091	0	0
1092	3.3452001E+00	4.8295999E+00	-2.7841001E+00#	1092	0	0
1093	3.3569000E+00	4.8214998E+00	-2.7190001E+00#	1093	0	0
1094	3.3908999E+00	4.5577002E+00	-2.8369000E+00#	1094	0	0
1095	3.3962801E+00	4.5219302E+00	-2.7698500E+00#	1095	0	0
1096	3.4014001E+00	4.4861999E+00	-2.7028000E+00#	1096	0	0
1097	3.4298000E+00	4.2825999E+00	-2.8213999E+00#	1097	0	0
1098	3.4389601E+00	4.2162099E+00	-2.7518001E+00#	1098	0	0

1099	3.4472001E+00	4.1500001E+00	-2.6822000E+00#	1099	0	0
1100	3.4656000E+00	4.0008001E+00	-2.8023000E+00#	1100	0	0
1101	3.4772100E+00	3.9087999E+00	-2.7296500E+00#	1101	0	0
1102	3.4870000E+00	3.8171999E+00	-2.6570001E+00#	1102	0	0
1103	3.4993000E+00	3.7098999E+00	-2.7787001E+00#	1103	0	0
1104	3.5142200E+00	3.5954199E+00	-2.7017500E+00#	1104	0	0
1105	3.5262001E+00	3.4816000E+00	-2.6248000E+00#	1105	0	0
1106	3.5358000E+00	3.4033999E+00	-2.7484000E+00#	1106	0	0
1107	3.5532701E+00	3.2706800E+00	-2.6659000E+00#	1107	0	0
1108	3.5666001E+00	3.1389000E+00	-2.5834000E+00#	1108	0	0
1109	3.5727000E+00	3.0801001E+00	-2.7090001E+00#	1109	0	0
1110	3.5854599E+00	2.9413300E+00	-2.6203499E+00#	1110	0	0
1111	3.5936000E+00	2.8038001E+00	-2.5316999E+00#	1111	0	0
1112	3.5936000E+00	2.8038001E+00	-2.6672001E+00#	1112	0	0
1113	3.6002901E+00	2.6682401E+00	-2.5750999E+00#	1113	0	0
1114	3.6025000E+00	2.5341001E+00	-2.4830000E+00#	1114	0	0
1115	3.6032000E+00	2.4256999E+00	-2.5997000E+00#	1115	0	0
1116	3.6039400E+00	2.3367500E+00	-2.5122499E+00#	1116	0	0
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1120	3.6041999E+00	1.9265000E+00	-2.3525000E+00#	1120	0	0
1121	3.6013000E+00	1.7072001E+00	-2.4480000E+00#	1121	0	0
1122	3.5978401E+00	1.6403100E+00	-2.3592000E+00#	1122	0	0
1123	3.5932000E+00	1.5739000E+00	-2.2704000E+00#	1123	0	0
1124	3.5768001E+00	1.3225000E+00	-2.3571000E+00#	1124	0	0
1125	3.5734301E+00	1.2570800E+00	-2.2613001E+00#	1125	0	0
1126	3.5689001E+00	1.1921000E+00	-2.1654999E+00#	1126	0	0
1127	2.7284400E+00	5.2030001E+00	-2.8492000E+00#	1127	0	0
1128	2.7347400E+00	5.1996899E+00	-2.7841001E+00#	1128	0	0
1129	2.7410400E+00	5.1963801E+00	-2.7190001E+00#	1129	0	0
1130	2.8713100E+00	4.8858399E+00	-2.8359001E+00#	1130	0	0
1131	2.8808601E+00	4.8585701E+00	-2.7693501E+00#	1131	0	0
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1134	3.0068400E+00	4.5181499E+00	-2.7505500E+00#	1134	0	0
1135	3.0219300E+00	4.4692101E+00	-2.6822000E+00#	1135	0	0
1136	3.1035099E+00	4.2372398E+00	-2.7976501E+00#	1136	0	0
1137	3.1172299E+00	4.1760302E+00	-2.7273200E+00#	1137	0	0
1138	3.1301000E+00	4.1149302E+00	-2.6570001E+00#	1138	0	0
1139	3.1695900E+00	3.9257901E+00	-2.7707000E+00#	1139	0	0
1140	3.1839399E+00	3.8558099E+00	-2.6977501E+00#	1140	0	0
1141	3.1971300E+00	3.7859900E+00	-2.6248000E+00#	1141	0	0
1142	3.2234900E+00	3.6109300E+00	-2.7350500E+00#	1142	0	0
1143	3.2379799E+00	3.5376501E+00	-2.6592200E+00#	1143	0	0
1144	3.2511499E+00	3.4645801E+00	-2.5834000E+00#	1144	0	0
1145	3.2478600E+00	3.3103099E+00	-2.6881001E+00#	1145	0	0
1146	3.2599001E+00	3.2422800E+00	-2.6099000E+00#	1146	0	0
1147	3.2707701E+00	3.1744599E+00	-2.5316999E+00#	1147	0	0
1148	3.2846601E+00	3.0874801E+00	-2.6521499E+00#	1148	0	0
1149	3.2976799E+00	2.9972000E+00	-2.5675700E+00#	1149	0	0
1150	3.3085999E+00	2.9073601E+00	-2.4830000E+00#	1150	0	0
1151	3.3209300E+00	2.7997401E+00	-2.5997000E+00#	1151	0	0
1152	3.3311601E+00	2.7114699E+00	-2.5122499E+00#	1152	0	0
1153	3.3393500E+00	2.6236899E+00	-2.4247999E+00#	1153	0	0
1154	3.3571801E+00	2.4598100E+00	-2.5301001E+00#	1154	0	0

1155	3.3676600E+00	2.3809900E+00	-2.4412999E+00#	1155	0	0
1156	3.3764400E+00	2.3025200E+00	-2.3525000E+00#	1156	0	0
1157	3.3992000E+00	2.0807099E+00	-2.4480000E+00#	1157	0	0
1158	3.4034500E+00	2.0128901E+00	-2.3592000E+00#	1158	0	0
1159	3.4064400E+00	1.9454300E+00	-2.2704000E+00#	1159	0	0
1160	3.4132700E+00	1.7006700E+00	-2.3571000E+00#	1160	0	0
1161	3.4150100E+00	1.6393700E+00	-2.2613001E+00#	1161	0	0
1162	3.4156799E+00	1.5783800E+00	-2.1654999E+00#	1162	0	0
1163	3.4294400E+00	1.1049000E+00	-2.2084999E+00#	1163	0	0
1164	3.4294400E+00	1.1048800E+00	-2.1268499E+00#	1164	0	0
1165	3.4294400E+00	1.1048501E+00	-2.0452001E+00#	1165	0	0
1166	3.4366500E+00	1.2661300E+00	-2.0160000E+00#	1166	0	0
1167	3.4459801E+00	1.4790601E+00	-2.0160000E+00#	1167	0	0
1168	3.4031601E+00	8.1164002E-01	-2.1285000E+00#	1168	0	0
1169	3.4040201E+00	8.7137997E-01	-2.0135000E+00#	1169	0	0
1170	3.4038200E+00	9.3137002E-01	-1.8985000E+00#	1170	0	0
1171	3.4366500E+00	1.2661300E+00	-1.9710000E+00#	1171	0	0
1172	3.4459801E+00	1.4790601E+00	-1.9710000E+00#	1172	0	0
1173	3.3364899E+00	3.6269999E-01	-1.9960999E+00#	1173	0	0
1174	3.3557799E+00	4.7881001E-01	-1.9110500E+00#	1174	0	0
1175	3.3709900E+00	5.9660000E-01	-1.8260000E+00#	1175	0	0
1176	3.4160299E+00	9.1907001E-01	-1.8260000E+00#	1176	0	0
1177	3.4323599E+00	1.1660800E+00	-1.8260000E+00#	1177	0	0
1178	3.2369900E+00	-1.0570000E-01	-1.8420000E+00#	1178	0	0
1179	3.3114300E+00	2.0597000E-01	-1.7752500E+00#	1179	0	0
1180	3.3552301E+00	5.3074002E-01	-1.7085000E+00#	1180	0	0
1181	3.4160299E+00	9.1907001E-01	-1.7810000E+00#	1181	0	0
1182	3.4323599E+00	1.1660800E+00	-1.7810000E+00#	1182	0	0
1183	3.1219299E+00	-5.5001003E-01	-1.6596000E+00#	1183	0	0
1184	3.2268100E+00	-2.1196000E-01	-1.6478000E+00#	1184	0	0
1185	3.2944300E+00	1.4241000E-01	-1.6360000E+00#	1185	0	0
1186	3.3658900E+00	5.6211001E-01	-1.6360000E+00#	1186	0	0
1187	3.4036701E+00	8.1537998E-01	-1.6360000E+00#	1187	0	0
1188	3.1219299E+00	-5.5001003E-01	-1.4650000E+00#	1188	0	0
1189	3.2268100E+00	-2.1196000E-01	-1.5050000E+00#	1189	0	0
1190	3.2944300E+00	1.4241000E-01	-1.5450000E+00#	1190	0	0
1191	3.3658900E+00	5.6211001E-01	-1.5910000E+00#	1191	0	0
1192	3.4036701E+00	8.1537998E-01	-1.5910000E+00#	1192	0	0
1193	3.1795499E+00	-3.4757000E-01	-1.4006000E+00#	1193	0	0
1194	3.2462499E+00	-1.0665000E-01	-1.4253000E+00#	1194	0	0
1195	3.2944300E+00	1.4241000E-01	-1.4500000E+00#	1195	0	0
1196	3.3471899E+00	4.3259999E-01	-1.4500000E+00#	1196	0	0
1197	3.2745600E+00	5.4770000E-02	-1.3650000E+00#	1197	0	0
1198	3.2987700E+00	1.8071000E-01	-1.3783300E+00#	1198	0	0
1199	3.3229799E+00	3.0666000E-01	-1.3916700E+00#	1199	0	0
1200	3.3471899E+00	4.3259999E-01	-1.4050000E+00#	1200	0	0
1201	2.0839000E+00	5.4930000E+00	-2.8492000E+00#	1201	0	0
1202	2.0839000E+00	5.4930000E+00	-2.7841001E+00#	1202	0	0
1203	2.0839000E+00	5.4930000E+00	-2.7190001E+00#	1203	0	0
1204	2.3206000E+00	5.1552000E+00	-2.8348999E+00#	1204	0	0
1205	2.3325500E+00	5.1368098E+00	-2.7688501E+00#	1205	0	0
1206	2.3443999E+00	5.1184001E+00	-2.7028000E+00#	1206	0	0
1207	2.5297000E+00	4.8072000E+00	-2.8164001E+00#	1207	0	0
1208	2.5486400E+00	4.7761302E+00	-2.7493000E+00#	1208	0	0
1209	2.5673001E+00	4.7449999E+00	-2.6822000E+00#	1209	0	0
1210	2.7261000E+00	4.4415002E+00	-2.7930000E+00#	1210	0	0

1211	2.7371199E+00	4.4104500E+00	-2.7249999E+00#	1211	0	0
1212	2.7479000E+00	4.3793998E+00	-2.6570001E+00#	1212	0	0
1213	2.8276000E+00	4.1132002E+00	-2.7627001E+00#	1213	0	0
1214	2.8348401E+00	4.0862899E+00	-2.6937499E+00#	1214	0	0
1215	2.8419001E+00	4.0594001E+00	-2.6248000E+00#	1215	0	0
1216	2.9003000E+00	3.7909999E+00	-2.7217000E+00#	1216	0	0
1217	2.9032300E+00	3.7748499E+00	-2.6525500E+00#	1217	0	0
1218	2.9061000E+00	3.7586999E+00	-2.5834000E+00#	1218	0	0
1219	2.9099000E+00	3.5081999E+00	-2.6672001E+00#	1219	0	0
1220	2.9099000E+00	3.5081999E+00	-2.5994501E+00#	1220	0	0
1221	2.9099000E+00	3.5081999E+00	-2.5316999E+00#	1221	0	0
1222	2.9542999E+00	3.3383999E+00	-2.6371000E+00#	1222	0	0
1223	2.9655399E+00	3.2925701E+00	-2.5600500E+00#	1223	0	0
1224	2.9762001E+00	3.2467999E+00	-2.4830000E+00#	1224	0	0
1225	3.0000000E+00	3.1412001E+00	-2.5997000E+00#	1225	0	0
1226	3.0195899E+00	3.0546200E+00	-2.5122499E+00#	1226	0	0
1227	3.0371001E+00	2.9683001E+00	-2.4247999E+00#	1227	0	0
1228	3.0727000E+00	2.8071001E+00	-2.5301001E+00#	1228	0	0
1229	3.0920200E+00	2.7294199E+00	-2.4412999E+00#	1229	0	0
1230	3.1096001E+00	2.6519001E+00	-2.3525000E+00#	1230	0	0
1231	3.1585000E+00	2.4305999E+00	-2.4480000E+00#	1231	0	0
1232	3.1706200E+00	2.3627400E+00	-2.3592000E+00#	1232	0	0
1233	3.1814001E+00	2.2951000E+00	-2.2704000E+00#	1233	0	0
1234	3.2098999E+00	2.0590000E+00	-2.3571000E+00#	1234	0	0
1235	3.2158201E+00	2.0020900E+00	-2.2613001E+00#	1235	0	0
1236	3.2207999E+00	1.9454000E+00	-2.1654999E+00#	1236	0	0
1237	3.2558999E+00	1.5431000E+00	-2.2084999E+00#	1237	0	0
1238	3.2558999E+00	1.5430501E+00	-2.1268499E+00#	1238	0	0
1239	3.2558999E+00	1.5430000E+00	-2.0452001E+00#	1239	0	0
1240	3.2420001E+00	1.7039000E+00	-2.0160000E+00#	1240	0	0
1241	3.2234001E+00	1.9162000E+00	-2.0160000E+00#	1241	0	0
1242	3.2681000E+00	1.2489001E+00	-2.1285000E+00#	1242	0	0
1243	3.2611599E+00	1.3082500E+00	-2.0135000E+00#	1243	0	0
1244	3.2531500E+00	1.3677000E+00	-1.8985000E+00#	1244	0	0
1245	3.2420001E+00	1.7039000E+00	-1.9710000E+00#	1245	0	0
1246	3.2234001E+00	1.9162000E+00	-1.9710000E+00#	1246	0	0
1247	3.2606001E+00	7.9509997E-01	-1.9960999E+00#	1247	0	0
1248	3.2645800E+00	9.1272998E-01	-1.9110500E+00#	1248	0	0
1249	3.2643001E+00	1.0315000E+00	-1.8260000E+00#	1249	0	0
1250	3.2667999E+00	1.3571000E+00	-1.8260000E+00#	1250	0	0
1251	3.2507999E+00	1.6041000E+00	-1.8260000E+00#	1251	0	0
1252	3.2230999E+00	3.1770000E-01	-1.8420000E+00#	1252	0	0
1253	3.2562201E+00	6.3643003E-01	-1.7752500E+00#	1253	0	0
1254	3.2572501E+00	9.6415001E-01	-1.7085000E+00#	1254	0	0
1255	3.2667999E+00	1.3571000E+00	-1.7810000E+00#	1255	0	0
1256	3.2507999E+00	1.6041000E+00	-1.7810000E+00#	1256	0	0
1257	3.1666999E+00	-1.4430000E-01	-1.6596000E+00#	1257	0	0
1258	3.2270899E+00	2.0773000E-01	-1.6478000E+00#	1258	0	0
1259	3.2477000E+00	5.7120001E-01	-1.6360000E+00#	1259	0	0
1260	3.2637000E+00	9.9659997E-01	-1.6360000E+00#	1260	0	0
1261	3.2681000E+00	1.2527000E+00	-1.6360000E+00#	1261	0	0
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1263	3.2270899E+00	2.0773000E-01	-1.5050000E+00#	1263	0	0
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1265	3.2637000E+00	9.9659997E-01	-1.5910000E+00#	1265	0	0
1266	3.2681000E+00	1.2527000E+00	-1.5910000E+00#	1266	0	0

1267	3.1977000E+00	7.0400000E-02	-1.4006000E+00#	1267	0	0
1268	3.2324100E+00	3.1797001E-01	-1.4253000E+00#	1268	0	0
1269	3.2477000E+00	5.7120001E-01	-1.4500000E+00#	1269	0	0
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1271	3.2393999E+00	4.8170000E-01	-1.3650000E+00#	1271	0	0
1272	3.2469699E+00	6.0973001E-01	-1.3783300E+00#	1272	0	0
1273	3.2545300E+00	7.3777002E-01	-1.3916700E+00#	1273	0	0
1274	3.2621000E+00	8.6580002E-01	-1.4050000E+00#	1274	0	0
1275	1.9805000E+00	5.5310998E+00	-2.8492000E+00#	1275	0	0
1276	1.9563000E+00	5.5396500E+00	-2.7841001E+00#	1276	0	0
1277	1.9321001E+00	5.5482001E+00	-2.7190001E+00#	1277	0	0
1278	2.1068001E+00	5.2462001E+00	-2.8348999E+00#	1278	0	0
1279	2.1133800E+00	5.2308502E+00	-2.7688501E+00#	1279	0	0
1280	2.1199000E+00	5.2154999E+00	-2.7028000E+00#	1280	0	0
1281	2.2326000E+00	4.9520998E+00	-2.8164001E+00#	1281	0	0
1282	2.2436800E+00	4.9267101E+00	-2.7493000E+00#	1282	0	0
1283	2.2546000E+00	4.9013000E+00	-2.6822000E+00#	1283	0	0
1284	2.3666000E+00	4.6430001E+00	-2.7930000E+00#	1284	0	0
1285	2.3797200E+00	4.6131101E+00	-2.7249999E+00#	1285	0	0
1286	2.3926001E+00	4.5832000E+00	-2.6570001E+00#	1286	0	0
1287	2.5077000E+00	4.3157001E+00	-2.7627001E+00#	1287	0	0
1288	2.5193000E+00	4.2880602E+00	-2.6937499E+00#	1288	0	0
1289	2.5307000E+00	4.2603998E+00	-2.6248000E+00#	1289	0	0
1290	2.6621001E+00	3.9619000E+00	-2.7217000E+00#	1290	0	0
1291	2.6711500E+00	3.9425099E+00	-2.6525500E+00#	1291	0	0
1292	2.6801000E+00	3.9231000E+00	-2.5834000E+00#	1292	0	0
1293	1.2958500E+00	5.7303100E+00	-2.8492000E+00#	1293	0	0
1294	1.2833200E+00	5.7330999E+00	-2.7841001E+00#	1294	0	0
1295	1.2708000E+00	5.7359200E+00	-2.7190001E+00#	1295	0	0
1296	1.5030500E+00	5.4641600E+00	-2.8359001E+00#	1296	0	0
1297	1.5225199E+00	5.4394002E+00	-2.7693501E+00#	1297	0	0
1298	1.5417900E+00	5.4145799E+00	-2.7028000E+00#	1298	0	0
1299	1.6910800E+00	5.1909199E+00	-2.8189001E+00#	1299	0	0
1300	1.7239799E+00	5.1461101E+00	-2.7505500E+00#	1300	0	0
1301	1.7562500E+00	5.1011100E+00	-2.6822000E+00#	1301	0	0
1302	1.8803200E+00	4.9041100E+00	-2.7976501E+00#	1302	0	0
1303	1.9220099E+00	4.8437901E+00	-2.7273200E+00#	1303	0	0
1304	1.9625601E+00	4.7831702E+00	-2.6570001E+00#	1304	0	0
1305	2.0618601E+00	4.6051302E+00	-2.7707000E+00#	1305	0	0
1306	2.0987000E+00	4.5387702E+00	-2.6977501E+00#	1306	0	0
1307	2.1342299E+00	4.4721999E+00	-2.6248000E+00#	1307	0	0
1308	2.2344100E+00	4.2938499E+00	-2.7350500E+00#	1308	0	0
1309	2.2709799E+00	4.2240100E+00	-2.6592200E+00#	1309	0	0
1310	2.3060701E+00	4.1539798E+00	-2.5834000E+00#	1310	0	0
1311	2.4578400E+00	3.9326000E+00	-2.6881001E+00#	1311	0	0
1312	2.4863601E+00	3.8674300E+00	-2.6099000E+00#	1312	0	0
1313	2.5136299E+00	3.8021801E+00	-2.5316999E+00#	1313	0	0
1314	2.5458601E+00	3.7202001E+00	-2.6521499E+00#	1314	0	0
1315	2.5814199E+00	3.6323600E+00	-2.5675700E+00#	1315	0	0
1316	2.6146801E+00	3.5444300E+00	-2.4830000E+00#	1316	0	0
1317	2.6531999E+00	3.4391501E+00	-2.5997000E+00#	1317	0	0
1318	2.6846199E+00	3.3528399E+00	-2.5122499E+00#	1318	0	0
1319	2.7138100E+00	3.2665200E+00	-2.4247999E+00#	1319	0	0
1320	2.7682800E+00	3.1077700E+00	-2.5301001E+00#	1320	0	0
1321	2.7945600E+00	3.0332899E+00	-2.4412999E+00#	1321	0	0
1322	2.8191199E+00	2.9588201E+00	-2.3525000E+00#	1322	0	0

1323	2.8867099E+00	2.7479000E+00	-2.4480000E+00#	1323	0	0
1324	2.9006999E+00	2.6814301E+00	-2.3592000E+00#	1324	0	0
1325	2.9241099E+00	2.6150200E+00	-2.2704000E+00#	1325	0	0
1326	2.9840901E+00	2.3744900E+00	-2.3571000E+00#	1326	0	0
1327	2.9983499E+00	2.3151300E+00	-2.2613001E+00#	1327	0	0
1328	3.0115099E+00	2.2558701E+00	-2.1654999E+00#	1328	0	0
1329	3.0919900E+00	1.8496600E+00	-2.2084999E+00#	1329	0	0
1330	3.0919900E+00	1.8496400E+00	-2.1268499E+00#	1330	0	0
1331	3.0919900E+00	1.8496100E+00	-2.0452001E+00#	1331	0	0
1332	3.0632701E+00	2.0075400E+00	-2.0160000E+00#	1332	0	0
1333	3.0182800E+00	2.2253900E+00	-2.0160000E+00#	1333	0	0
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1335	3.1201701E+00	1.6157600E+00	-2.0135000E+00#	1335	0	0
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1337	3.0632701E+00	2.0075400E+00	-1.9710000E+00#	1337	0	0
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1342	3.1192999E+00	1.6684600E+00	-1.8260000E+00#	1342	0	0
1343	3.0816000E+00	1.9089900E+00	-1.8260000E+00#	1343	0	0
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1346	3.1475999E+00	1.2779000E+00	-1.7085000E+00#	1346	0	0
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1348	3.0816000E+00	1.9089900E+00	-1.7810000E+00#	1348	0	0
1349	3.1633799E+00	2.0429000E-01	-1.6596000E+00#	1349	0	0
1350	3.1879699E+00	5.4222000E-01	-1.6478000E+00#	1350	0	0
1351	3.1759000E+00	8.8734001E-01	-1.6360000E+00#	1351	0	0
1352	3.1545999E+00	1.3013999E+00	-1.6360000E+00#	1352	0	0
1353	3.1316400E+00	1.5614200E+00	-1.6360000E+00#	1353	0	0
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1358	3.1316400E+00	1.5614200E+00	-1.5910000E+00#	1358	0	0
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1360	3.1859500E+00	6.3195002E-01	-1.4253000E+00#	1360	0	0
1361	3.1759000E+00	8.8734001E-01	-1.4500000E+00#	1361	0	0
1362	3.1643901E+00	1.1736300E+00	-1.4500000E+00#	1362	0	0
1363	3.1772399E+00	7.9421002E-01	-1.3650000E+00#	1363	0	0
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1370	8.7699997E-01	5.6127000E+00	-2.8369000E+00#	1370	0	0
1371	9.1144001E-01	5.5813498E+00	-2.7698500E+00#	1371	0	0
1372	9.4550002E-01	5.5497999E+00	-2.7028000E+00#	1372	0	0
1373	1.1240000E+00	5.3704000E+00	-2.8213999E+00#	1373	0	0
1374	1.1829200E+00	5.3107100E+00	-2.7518001E+00#	1374	0	0
1375	1.2405000E+00	5.2504001E+00	-2.6822000E+00#	1375	0	0
1376	1.3652000E+00	5.1139998E+00	-2.8023000E+00#	1376	0	0
1377	1.4419301E+00	5.0289898E+00	-2.7296500E+00#	1377	0	0
1378	1.5160000E+00	4.9429002E+00	-2.6570001E+00#	1378	0	0

1379	1.5827000E+00	4.8481002E+00	-2.7787001E+00#	1379	0	0
1380	1.6530900E+00	4.7480898E+00	-2.7017500E+00#	1380	0	0
1381	1.7201999E+00	4.6472001E+00	-2.6248000E+00#	1381	0	0
1382	1.7654999E+00	4.5791001E+00	-2.7484000E+00#	1382	0	0
1383	1.8410600E+00	4.4647002E+00	-2.6659000E+00#	1383	0	0
1384	1.9123000E+00	4.3492999E+00	-2.5834000E+00#	1384	0	0
1385	1.9438000E+00	4.2979002E+00	-2.7090001E+00#	1385	0	0
1386	2.0183401E+00	4.1752300E+00	-2.6203499E+00#	1386	0	0
1387	2.0878999E+00	4.0516000E+00	-2.5316999E+00#	1387	0	0
1388	2.0878999E+00	4.0516000E+00	-2.6672001E+00#	1388	0	0
1389	2.1583099E+00	3.9272101E+00	-2.5750999E+00#	1389	0	0
1390	2.2235999E+00	3.8020000E+00	-2.4830000E+00#	1390	0	0
1391	2.2770000E+00	3.6989999E+00	-2.5997000E+00#	1391	0	0
1392	2.3203900E+00	3.6145000E+00	-2.5122499E+00#	1392	0	0
1393	2.3613999E+00	3.5297000E+00	-2.4247999E+00#	1393	0	0
1394	2.4346001E+00	3.3756001E+00	-2.5301001E+00#	1394	0	0
1395	2.4673800E+00	3.3049300E+00	-2.4412999E+00#	1395	0	0
1396	2.4985001E+00	3.2341001E+00	-2.3525000E+00#	1396	0	0
1397	2.5832000E+00	3.0350001E+00	-2.4480000E+00#	1397	0	0
1398	2.6096900E+00	2.9706900E+00	-2.3592000E+00#	1398	0	0
1399	2.6348000E+00	2.9063001E+00	-2.2704000E+00#	1399	0	0
1400	2.7274001E+00	2.6654000E+00	-2.3571000E+00#	1400	0	0
1401	2.7505100E+00	2.6047299E+00	-2.2613001E+00#	1401	0	0
1402	2.7723999E+00	2.5439999E+00	-2.1654999E+00#	1402	0	0
1403	2.8993001E+00	2.1389999E+00	-2.2084999E+00#	1403	0	0
1404	2.8993001E+00	2.1389999E+00	-2.1268499E+00#	1404	0	0
1405	2.8993001E+00	2.1389999E+00	-2.0452001E+00#	1405	0	0
1406	2.8562000E+00	2.2925999E+00	-2.0160000E+00#	1406	0	0
1407	2.7836001E+00	2.5128000E+00	-2.0160000E+00#	1407	0	0
1408	2.9661000E+00	1.8555000E+00	-2.1285000E+00#	1408	0	0
1409	2.9502599E+00	1.9082800E+00	-2.0135000E+00#	1409	0	0
1410	2.9335001E+00	1.9610000E+00	-1.8985000E+00#	1410	0	0
1411	2.8562000E+00	2.2925999E+00	-1.9710000E+00#	1411	0	0
1412	2.7836001E+00	2.5128000E+00	-1.9710000E+00#	1412	0	0
1413	3.0469999E+00	1.4069000E+00	-1.9960999E+00#	1413	0	0
1414	3.0309100E+00	1.5179600E+00	-1.9110500E+00#	1414	0	0
1415	3.0107999E+00	1.6294000E+00	-1.8260000E+00#	1415	0	0
1416	2.9421999E+00	1.9640000E+00	-1.8260000E+00#	1416	0	0
1417	2.8838999E+00	2.1961999E+00	-1.8260000E+00#	1417	0	0
1418	3.1078999E+00	9.1130000E-01	-1.8420000E+00#	1418	0	0
1419	3.0759001E+00	1.2442100E+00	-1.7752500E+00#	1419	0	0
1420	3.0078001E+00	1.5794500E+00	-1.7085000E+00#	1420	0	0
1421	2.9421999E+00	1.9640000E+00	-1.7810000E+00#	1421	0	0
1422	2.8838999E+00	2.1961999E+00	-1.7810000E+00#	1422	0	0
1423	3.1217999E+00	5.5040002E-01	-1.6596000E+00#	1423	0	0
1424	3.1142700E+00	8.7081999E-01	-1.6478000E+00#	1424	0	0
1425	3.0734000E+00	1.1949000E+00	-1.6360000E+00#	1425	0	0
1426	3.0171001E+00	1.5944999E+00	-1.6360000E+00#	1426	0	0
1427	2.9661000E+00	1.8555000E+00	-1.6360000E+00#	1427	0	0
1428	3.1217999E+00	5.5040002E-01	-1.4650000E+00#	1428	0	0
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1430	3.0734000E+00	1.1949000E+00	-1.5450000E+00#	1430	0	0
1431	3.0171001E+00	1.5944999E+00	-1.5910000E+00#	1431	0	0
1432	2.9661000E+00	1.8555000E+00	-1.5910000E+00#	1432	0	0
1433	3.1240001E+00	6.8660003E-01	-1.4006000E+00#	1433	0	0
1434	3.1090701E+00	9.3989998E-01	-1.4253000E+00#	1434	0	0

1435	3.0734000E+00	1.1949000E+00	-1.4500000E+00#	1435	0	0
1436	3.0376999E+00	1.4707000E+00	-1.4500000E+00#	1436	0	0
1437	3.0850000E+00	1.0992000E+00	-1.3650000E+00#	1437	0	0
1438	3.0692301E+00	1.2230300E+00	-1.3783300E+00#	1438	0	0
1439	3.0534699E+00	1.3468699E+00	-1.3916700E+00#	1439	0	0
1440	3.0376999E+00	1.4707000E+00	-1.4050000E+00#	1440	0	0
1441	4.8170000E-01	5.8551998E+00	-2.8492000E+00#	1441	0	0
1442	4.9685001E-01	5.8539000E+00	-2.7841001E+00#	1442	0	0
1443	5.1200002E-01	5.8526001E+00	-2.7190001E+00#	1443	0	0
1444	6.5780002E-01	5.6424999E+00	-2.8369000E+00#	1444	0	0
1445	6.8027002E-01	5.6141901E+00	-2.7698500E+00#	1445	0	0
1446	7.0249999E-01	5.5858002E+00	-2.7028000E+00#	1446	0	0
1447	8.2900000E-01	5.4238000E+00	-2.8213999E+00#	1447	0	0
1448	8.7009001E-01	5.3708501E+00	-2.7518001E+00#	1448	0	0
1449	9.1030002E-01	5.3175998E+00	-2.6822000E+00#	1449	0	0
1450	1.0009000E+00	5.1975999E+00	-2.8023000E+00#	1450	0	0
1451	1.0569400E+00	5.1237302E+00	-2.7296500E+00#	1451	0	0
1452	1.1112000E+00	5.0493002E+00	-2.6570001E+00#	1452	0	0
1453	1.1755000E+00	4.9625001E+00	-2.7787001E+00#	1453	0	0
1454	1.2456900E+00	4.8708501E+00	-2.7017500E+00#	1454	0	0
1455	1.3130000E+00	4.7782998E+00	-2.6248000E+00#	1455	0	0
1456	1.3602999E+00	4.7153001E+00	-2.7484000E+00#	1456	0	0
1457	1.4418200E+00	4.6091299E+00	-2.6659000E+00#	1457	0	0
1458	1.5193000E+00	4.5016999E+00	-2.5834000E+00#	1458	0	0
1459	1.5540000E+00	4.4537001E+00	-2.7090001E+00#	1459	0	0
1460	1.6345100E+00	4.3399100E+00	-2.6203499E+00#	1460	0	0
1461	1.7104000E+00	4.2248998E+00	-2.5316999E+00#	1461	0	0
1462	1.7104000E+00	4.2248998E+00	-2.6672001E+00#	1462	0	0
1463	1.7838900E+00	4.1108999E+00	-2.5750999E+00#	1463	0	0
1464	1.8528000E+00	3.9958999E+00	-2.4830000E+00#	1464	0	0
1465	1.9074000E+00	3.9024000E+00	-2.5997000E+00#	1465	0	0
1466	1.9620700E+00	3.8097799E+00	-2.5122499E+00#	1466	0	0
1467	2.0137000E+00	3.7165999E+00	-2.4247999E+00#	1467	0	0
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1469	2.1199100E+00	3.5377901E+00	-2.4412999E+00#	1469	0	0
1470	2.1601000E+00	3.4691999E+00	-2.3525000E+00#	1470	0	0
1471	2.2737999E+00	3.2732000E+00	-2.4480000E+00#	1471	0	0
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1473	2.3366001E+00	3.1510000E+00	-2.2704000E+00#	1473	0	0
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1475	2.4581800E+00	2.8821900E+00	-2.2613001E+00#	1475	0	0
1476	2.4800999E+00	2.8297000E+00	-2.1654999E+00#	1476	0	0
1477	2.6354001E+00	2.4568000E+00	-2.2084999E+00#	1477	0	0
1478	2.6354499E+00	2.4568000E+00	-2.1268499E+00#	1478	0	0
1479	2.6355000E+00	2.4568000E+00	-2.0452001E+00#	1479	0	0
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1481	2.4914999E+00	2.8027000E+00	-2.0160000E+00#	1481	0	0
1482	2.7363000E+00	2.1802001E+00	-2.1285000E+00#	1482	0	0
1483	2.7116499E+00	2.2346599E+00	-2.0135000E+00#	1483	0	0
1484	2.6859500E+00	2.2888999E+00	-1.8985000E+00#	1484	0	0
1485	2.5734999E+00	2.6059000E+00	-1.9710000E+00#	1485	0	0
1486	2.4914999E+00	2.8027000E+00	-1.9710000E+00#	1486	0	0
1487	2.8666000E+00	1.7455000E+00	-1.9960999E+00#	1487	0	0
1488	2.8347001E+00	1.8588001E+00	-1.9110500E+00#	1488	0	0
1489	2.7983999E+00	1.9719000E+00	-1.8260000E+00#	1489	0	0
1490	2.7023001E+00	2.2829001E+00	-1.8260000E+00#	1490	0	0

1491	2.6120999E+00	2.5135000E+00	-1.8260000E+00#	1491	0	0
1492	2.9754000E+00	1.2792000E+00	-1.8420000E+00#	1492	0	0
1493	2.9104199E+00	1.5929300E+00	-1.7752500E+00#	1493	0	0
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1495	2.7023001E+00	2.2829001E+00	-1.7810000E+00#	1495	0	0
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1497	3.0643001E+00	8.1160003E-01	-1.6596000E+00#	1497	0	0
1498	3.0144200E+00	1.1705000E+00	-1.6478000E+00#	1498	0	0
1499	2.9219999E+00	1.5281000E+00	-1.6360000E+00#	1499	0	0
1500	2.8085001E+00	1.9385000E+00	-1.6360000E+00#	1500	0	0
1501	2.7351000E+00	2.1838000E+00	-1.6360000E+00#	1501	0	0
1502	3.0643001E+00	8.1160003E-01	-1.4650000E+00#	1502	0	0
1503	3.0144200E+00	1.1705000E+00	-1.5050000E+00#	1503	0	0
1504	2.9219999E+00	1.5281000E+00	-1.5450000E+00#	1504	0	0
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1506	2.7351000E+00	2.1838000E+00	-1.5910000E+00#	1506	0	0
1507	3.0262001E+00	1.0358000E+00	-1.4006000E+00#	1507	0	0
1508	2.9842100E+00	1.2822000E+00	-1.4253000E+00#	1508	0	0
1509	2.9219999E+00	1.5281000E+00	-1.4500000E+00#	1509	0	0
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1511	2.9412999E+00	1.4404000E+00	-1.3650000E+00#	1511	0	0
1512	2.9096999E+00	1.5647000E+00	-1.3783300E+00#	1512	0	0
1513	2.8780999E+00	1.6890000E+00	-1.3916700E+00#	1513	0	0
1514	2.8464999E+00	1.8133000E+00	-1.4050000E+00#	1514	0	0
1515	4.4709501E+00	3.8092999E+00	-3.1208501E+00#	1515	0	0
1516	4.4752402E+00	3.4129300E+00	-3.1136999E+00#	1516	0	0
1517	4.4598699E+00	3.0139699E+00	-3.1044500E+00#	1517	0	0
1518	4.4263701E+00	2.6082001E+00	-3.0927501E+00#	1518	0	0
1519	4.3395300E+00	2.2602999E+00	-3.0776000E+00#	1519	0	0
1520	4.2230601E+00	1.9448900E+00	-3.0467501E+00#	1520	0	0
1521	4.0758500E+00	1.6772500E+00	-3.0092001E+00#	1521	0	0
1522	4.4038000E+00	3.8874500E+00	-3.1208501E+00#	1522	0	0
1523	4.3408999E+00	3.5827799E+00	-3.1136999E+00#	1523	0	0
1524	4.2761002E+00	3.2699800E+00	-3.1044500E+00#	1524	0	0
1525	4.2122102E+00	2.9417601E+00	-3.0927501E+00#	1525	0	0
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1528	3.3334999E+00	4.8361502E+00	-3.1208501E+00#	1528	0	0
1529	3.4319100E+00	4.4784298E+00	-3.1147001E+00#	1529	0	0
1530	3.5068400E+00	4.1205201E+00	-3.1069500E+00#	1530	0	0
1531	3.5736401E+00	3.7492499E+00	-3.0974000E+00#	1531	0	0
1532	3.6169600E+00	3.3772700E+00	-3.0855999E+00#	1532	0	0
1533	3.6258700E+00	3.0193200E+00	-3.0601001E+00#	1533	0	0
1534	3.6201100E+00	2.6545701E+00	-3.0301001E+00#	1534	0	0
1535	3.5933599E+00	2.3053000E+00	-2.9884000E+00#	1535	0	0
1536	3.5454199E+00	1.9032100E+00	-2.9230001E+00#	1536	0	0
1537	3.4808600E+00	1.5191600E+00	-2.8457999E+00#	1537	0	0
1538	3.3965800E+00	1.1301900E+00	-2.7488501E+00#	1538	0	0
1539	3.2781100E+00	7.8794998E-01	-2.6322999E+00#	1539	0	0
1540	3.1112001E+00	5.2434999E-01	-2.4707000E+00#	1540	0	0
1541	3.2484500E+00	4.8941498E+00	-3.1208501E+00#	1541	0	0
1542	3.2628400E+00	4.6035299E+00	-3.1147001E+00#	1542	0	0
1543	3.2744601E+00	4.3079200E+00	-3.1069500E+00#	1543	0	0
1544	3.2892900E+00	4.0014601E+00	-3.0974000E+00#	1544	0	0
1545	3.3083200E+00	3.6804600E+00	-3.0855999E+00#	1545	0	0
1546	3.3341200E+00	3.3390999E+00	-3.0601001E+00#	1546	0	0

1547	3.3427501E+00	2.9967201E+00	-3.0301001E+00#	1547	0	0
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1549	3.3255401E+00	2.2658401E+00	-2.9230001E+00#	1549	0	0
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1552	3.1868999E+00	1.1002400E+00	-2.6322999E+00#	1552	0	0
1553	1.9673500E+00	5.5344501E+00	-3.1208501E+00#	1553	0	0
1554	2.1692300E+00	5.1933098E+00	-3.1136999E+00#	1554	0	0
1555	2.3554101E+00	4.8401399E+00	-3.1044500E+00#	1555	0	0
1556	2.5292499E+00	4.4719100E+00	-3.0927501E+00#	1556	0	0
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1558	2.6848700E+00	3.7958701E+00	-3.0467501E+00#	1558	0	0
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1560	1.8769500E+00	5.5660501E+00	-3.1208501E+00#	1560	0	0
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1562	2.0681601E+00	4.9698300E+00	-3.1044500E+00#	1562	0	0
1563	2.1769800E+00	4.6537499E+00	-3.0927501E+00#	1563	0	0
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1565	2.4556401E+00	3.9480700E+00	-3.0467501E+00#	1565	0	0
1566	4.6505001E-01	5.8551998E+00	-3.1208501E+00#	1566	0	0
1567	7.2654998E-01	5.5939102E+00	-3.1147001E+00#	1567	0	0
1568	9.6548003E-01	5.3213401E+00	-3.1069500E+00#	1568	0	0
1569	1.2005200E+00	5.0345702E+00	-3.0974000E+00#	1569	0	0
1570	1.4143200E+00	4.7368398E+00	-3.0855999E+00#	1570	0	0
1571	1.5958101E+00	4.4336300E+00	-3.0601001E+00#	1571	0	0
1572	1.7688500E+00	4.1176801E+00	-3.0301001E+00#	1572	0	0
1573	1.9173900E+00	3.8045499E+00	-2.9884000E+00#	1573	0	0
1574	2.0738599E+00	3.4365900E+00	-2.9230001E+00#	1574	0	0
1575	2.2088399E+00	3.0756099E+00	-2.8457999E+00#	1575	0	0
1576	2.3336201E+00	2.6978400E+00	-2.7488501E+00#	1576	0	0
1577	2.4392300E+00	2.3073299E+00	-2.6322999E+00#	1577	0	0
1578	2.5369699E+00	1.8501101E+00	-2.4707000E+00#	1578	0	0
1579	2.5819600E+00	1.5172100E+00	-2.3336999E+00#	1579	0	0
1580	2.6109200E+00	1.1212300E+00	-2.1596999E+00#	1580	0	0
1581	2.6237400E+00	7.1003002E-01	-1.9626499E+00#	1581	0	0
1582	2.6089599E+00	3.7105000E-01	-1.7430500E+00#	1582	0	0
1583	2.5919499E+00	1.8500000E-01	-1.5124500E+00#	1583	0	0
1584	3.6890000E-01	5.8622999E+00	-3.1208501E+00#	1584	0	0
1585	5.1549000E-01	5.6175499E+00	-3.1147001E+00#	1585	0	0
1586	6.6904002E-01	5.3670201E+00	-3.1069500E+00#	1586	0	0
1587	8.2753998E-01	5.1094699E+00	-3.0974000E+00#	1587	0	0
1588	9.9431002E-01	4.8427601E+00	-3.0855999E+00#	1588	0	0
1589	1.1829900E+00	4.5614901E+00	-3.0601001E+00#	1589	0	0
1590	1.3676300E+00	4.2681098E+00	-3.0301001E+00#	1590	0	0
1591	1.5292000E+00	3.9769299E+00	-2.9884000E+00#	1591	0	0
1592	1.7010400E+00	3.6359799E+00	-2.9230001E+00#	1592	0	0
1593	1.8565300E+00	3.3006599E+00	-2.8457999E+00#	1593	0	0
1594	2.0058601E+00	2.9501801E+00	-2.7488501E+00#	1594	0	0
1595	2.1343200E+00	2.5924499E+00	-2.6322999E+00#	1595	0	0
1596	2.2671299E+00	2.1729600E+00	-2.4707000E+00#	1596	0	0
1597	2.3442199E+00	1.8642900E+00	-2.3336999E+00#	1597	0	0
1598	2.4273901E+00	1.4780400E+00	-2.1596999E+00#	1598	0	0
1599	2.4925599E+00	1.0852300E+00	-1.9626499E+00#	1599	0	0
1600	2.5492201E+00	6.6964000E-01	-1.7430500E+00#	1600	0	0
1601	2.5661500E+00	4.0580001E-01	-1.5124500E+00#	1601	0	0
1602	2.9931000E-01	-5.0844002E-01	-5.4150000E+00#	1602	0	0

1603	4.5734000E-01	-7.7688003E-01	-5.4150000E+00#	1603	0	0
1604	2.9931000E-01	-5.0844002E-01	-4.9749999E+00#	1604	0	0
1605	4.5734000E-01	-7.7688003E-01	-5.2249999E+00#	1605	0	0
1606	6.8994999E-01	-1.1720001E+00	-5.2249999E+00#	1606	0	0
1607	2.9931000E-01	-5.0844002E-01	-4.5349998E+00#	1607	0	0
1608	4.6977001E-01	-7.9799002E-01	-4.7016602E+00#	1608	0	0
1609	6.8994999E-01	-1.1720001E+00	-4.7016702E+00#	1609	0	0
1610	2.9931000E-01	-5.0844002E-01	-4.0949998E+00#	1610	0	0
1611	4.8220000E-01	-8.1910002E-01	-4.1783500E+00#	1611	0	0
1612	6.8994999E-01	-1.1720001E+00	-4.1783299E+00#	1612	0	0
1613	2.9931000E-01	-5.0844002E-01	-3.6550000E+00#	1613	0	0
1614	4.9463001E-01	-8.4021997E-01	-3.6550000E+00#	1614	0	0
1615	6.8994999E-01	-1.1720001E+00	-3.6550000E+00#	1615	0	0
1616	8.1042999E-01	-1.3766600E+00	-3.6550000E+00#	1616	0	0
1617	2.9931000E-01	-5.0844002E-01	-2.8583300E+00#	1617	0	0
1618	4.8195001E-01	-8.1866997E-01	-2.8583300E+00#	1618	0	0
1619	6.6457999E-01	-1.1289099E+00	-2.8583300E+00#	1619	0	0
1620	7.7371001E-01	-1.3142800E+00	-2.5750401E+00#	1620	0	0
1621	2.9931000E-01	-5.0844002E-01	-2.0616701E+00#	1621	0	0
1622	4.6926001E-01	-7.9712999E-01	-2.0616701E+00#	1622	0	0
1623	6.3920999E-01	-1.0858200E+00	-2.0616701E+00#	1623	0	0
1624	7.3697001E-01	-1.2518800E+00	-1.4950000E+00#	1624	0	0
1625	2.9931000E-01	-5.0844002E-01	-1.2650000E+00#	1625	0	0
1626	4.5658001E-01	-7.7559000E-01	-1.2650000E+00#	1626	0	0
1627	6.1385000E-01	-1.0427300E+00	-1.2650000E+00#	1627	0	0
1628	7.3697001E-01	-1.2518800E+00	-1.2650000E+00#	1628	0	0
1629	2.9931000E-01	-5.0844002E-01	-9.4875002E-01#	1629	0	0
1630	4.4822001E-01	-7.6138002E-01	-9.0834999E-01#	1630	0	0
1631	6.1385000E-01	-1.0427300E+00	-9.0833002E-01#	1631	0	0
1632	2.9931000E-01	-5.0844002E-01	-6.3249999E-01#	1632	0	0
1633	4.3983999E-01	-7.4715000E-01	-5.5167001E-01#	1633	0	0
1634	6.1385000E-01	-1.0427300E+00	-5.5167001E-01#	1634	0	0
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1638	2.9931000E-01	-5.0844002E-01	0.0000000E+00#	1638	0	0
1639	4.3147001E-01	-7.3293000E-01	0.0000000E+00#	1639	0	0
1640	3.5223001E-01	-4.7332001E-01	-5.4150000E+00#	1640	0	0
1641	5.3820002E-01	-7.2321999E-01	-5.4150000E+00#	1641	0	0
1642	3.5223001E-01	-4.7332001E-01	-4.9749999E+00#	1642	0	0
1643	5.3820002E-01	-7.2321999E-01	-5.2249999E+00#	1643	0	0
1644	8.1191999E-01	-1.0910500E+00	-5.2249999E+00#	1644	0	0
1645	3.5223001E-01	-4.7332001E-01	-4.5349998E+00#	1645	0	0
1646	5.5282998E-01	-7.4287999E-01	-4.7016602E+00#	1646	0	0
1647	8.1191999E-01	-1.0910500E+00	-4.7016702E+00#	1647	0	0
1648	3.5223001E-01	-4.7332001E-01	-4.0949998E+00#	1648	0	0
1649	5.6744999E-01	-7.6252002E-01	-4.1783500E+00#	1649	0	0
1650	8.1191999E-01	-1.0910500E+00	-4.1783299E+00#	1650	0	0
1651	3.5223001E-01	-4.7332001E-01	-3.6550000E+00#	1651	0	0
1652	5.8208001E-01	-7.8218001E-01	-3.6550000E+00#	1652	0	0
1653	8.1191999E-01	-1.0910500E+00	-3.6550000E+00#	1653	0	0
1654	9.5371002E-01	-1.2815800E+00	-3.6550000E+00#	1654	0	0
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1657	7.8206998E-01	-1.0509300E+00	-2.8583300E+00#	1657	0	0
1658	9.1049999E-01	-1.2235100E+00	-2.5750401E+00#	1658	0	0

1659	3.5223001E-01	-4.7332001E-01	-2.0616701E+00#	1659	0	0
1660	5.5223000E-01	-7.4207002E-01	-2.0616701E+00#	1660	0	0
1661	7.5221997E-01	-1.0108200E+00	-2.0616701E+00#	1661	0	0
1662	8.6726999E-01	-1.1654100E+00	-1.4950000E+00#	1662	0	0
1663	3.5223001E-01	-4.7332001E-01	-1.2650000E+00#	1663	0	0
1664	5.3729999E-01	-7.2201997E-01	-1.2650000E+00#	1664	0	0
1665	7.2237003E-01	-9.7070998E-01	-1.2650000E+00#	1665	0	0
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1670	3.5223001E-01	-4.7332001E-01	-6.3249999E-01#	1670	0	0
1671	5.1760000E-01	-6.9554001E-01	-5.5167001E-01#	1671	0	0
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1673	3.5223001E-01	-4.7332001E-01	-3.1625000E-01#	1673	0	0
1674	5.0774997E-01	-6.8229997E-01	-1.9499999E-01#	1674	0	0
1675	7.2237003E-01	-9.7070998E-01	-1.9499999E-01#	1675	0	0
1676	3.5223001E-01	-4.7332001E-01	0.0000000E+00#	1676	0	0
1677	5.0774997E-01	-6.8229997E-01	0.0000000E+00#	1677	0	0
1678	4.0107000E-01	-4.3272001E-01	-5.4150000E+00#	1678	0	0
1679	6.1282003E-01	-6.6118002E-01	-5.4150000E+00#	1679	0	0
1680	4.0107000E-01	-4.3272001E-01	-4.9749999E+00#	1680	0	0
1681	6.1282003E-01	-6.6118002E-01	-5.2249999E+00#	1681	0	0
1682	9.2448997E-01	-9.9744999E-01	-5.2249999E+00#	1682	0	0
1683	4.0107000E-01	-4.3272001E-01	-4.5349998E+00#	1683	0	0
1684	6.2946999E-01	-6.7914999E-01	-4.7016602E+00#	1684	0	0
1685	9.2448997E-01	-9.9744999E-01	-4.7016702E+00#	1685	0	0
1686	4.0107000E-01	-4.3272001E-01	-4.0949998E+00#	1686	0	0
1687	6.4612001E-01	-6.9711000E-01	-4.1783500E+00#	1687	0	0
1688	9.2448997E-01	-9.9744999E-01	-4.1783299E+00#	1688	0	0
1689	4.0107000E-01	-4.3272001E-01	-3.6550000E+00#	1689	0	0
1690	6.6277999E-01	-7.1508998E-01	-3.6550000E+00#	1690	0	0
1691	9.2448997E-01	-9.9744999E-01	-3.6550000E+00#	1691	0	0
1692	1.0859400E+00	-1.1716400E+00	-3.6550000E+00#	1692	0	0
1693	4.0107000E-01	-4.3272001E-01	-2.8583300E+00#	1693	0	0
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1696	1.0367301E+00	-1.1185499E+00	-2.5750401E+00#	1696	0	0
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1698	6.2879002E-01	-6.7840999E-01	-2.0616701E+00#	1698	0	0
1699	8.5652000E-01	-9.2411000E-01	-2.0616701E+00#	1699	0	0
1700	9.8751003E-01	-1.0654401E+00	-1.4950000E+00#	1700	0	0
1701	4.0107000E-01	-4.3272001E-01	-1.2650000E+00#	1701	0	0
1702	6.1180001E-01	-6.6008002E-01	-1.2650000E+00#	1702	0	0
1703	8.2252997E-01	-8.8744003E-01	-1.2650000E+00#	1703	0	0
1704	9.8751003E-01	-1.0654401E+00	-1.2650000E+00#	1704	0	0
1705	4.0107000E-01	-4.3272001E-01	-9.4875002E-01#	1705	0	0
1706	6.0058999E-01	-6.4798999E-01	-9.0834999E-01#	1706	0	0
1707	8.2252997E-01	-8.8744003E-01	-9.0833002E-01#	1707	0	0
1708	4.0107000E-01	-4.3272001E-01	-6.3249999E-01#	1708	0	0
1709	5.8937001E-01	-6.3587999E-01	-5.5167001E-01#	1709	0	0
1710	8.2252997E-01	-8.8744003E-01	-5.5167001E-01#	1710	0	0
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1712	5.7814997E-01	-6.2377000E-01	-1.9499999E-01#	1712	0	0
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1714	4.0107000E-01	-4.3272001E-01	0.0000000E+00#	1714	0	0

1715	5.7814997E-01	-6.2377000E-01	0.0000000E+00#	1715	0	0
1716	4.6105999E-01	-3.6813000E-01	-5.4150000E+00#	1716	0	0
1717	7.0449001E-01	-5.6248999E-01	-5.4150000E+00#	1717	0	0
1718	4.6105999E-01	-3.6813000E-01	-4.9749999E+00#	1718	0	0
1719	7.0449001E-01	-5.6248999E-01	-5.2249999E+00#	1719	0	0
1720	1.0627900E+00	-8.4858000E-01	-5.2249999E+00#	1720	0	0
1721	4.6105999E-01	-3.6813000E-01	-4.5349998E+00#	1721	0	0
1722	7.2364002E-01	-5.7778001E-01	-4.7016602E+00#	1722	0	0
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1724	4.6105999E-01	-3.6813000E-01	-4.0949998E+00#	1724	0	0
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1726	1.0627900E+00	-8.4858000E-01	-4.1783299E+00#	1726	0	0
1727	4.6105999E-01	-3.6813000E-01	-3.6550000E+00#	1727	0	0
1728	7.6191998E-01	-6.0835999E-01	-3.6550000E+00#	1728	0	0
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1730	1.2483799E+00	-9.9677002E-01	-3.6550000E+00#	1730	0	0
1731	4.6105999E-01	-3.6813000E-01	-2.8583300E+00#	1731	0	0
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1738	1.1352299E+00	-9.0641999E-01	-1.4950000E+00#	1738	0	0
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1740	7.0331001E-01	-5.6155998E-01	-1.2650000E+00#	1740	0	0
1741	9.4556999E-01	-7.5498003E-01	-1.2650000E+00#	1741	0	0
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1743	4.6105999E-01	-3.6813000E-01	-9.4875002E-01#	1743	0	0
1744	6.9042999E-01	-5.5127001E-01	-9.0834999E-01#	1744	0	0
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1746	4.6105999E-01	-3.6813000E-01	-6.3249999E-01#	1746	0	0
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1748	9.4556999E-01	-7.5498003E-01	-5.5167001E-01#	1748	0	0
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1758	1.1773601E+00	-6.8076003E-01	-5.2249999E+00#	1758	0	0
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1761	1.1773601E+00	-6.8076003E-01	-4.7016702E+00#	1761	0	0
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1765	5.1076001E-01	-2.9532999E-01	-3.6550000E+00#	1765	0	0
1766	8.4406000E-01	-4.8804000E-01	-3.6550000E+00#	1766	0	0
1767	1.1773601E+00	-6.8076003E-01	-3.6550000E+00#	1767	0	0
1768	1.3829600E+00	-7.9964000E-01	-3.6550000E+00#	1768	0	0
1769	5.1076001E-01	-2.9532999E-01	-2.8583300E+00#	1769	0	0
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1771	1.1340700E+00	-6.5573001E-01	-2.8583300E+00#	1771	0	0
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1773	5.1076001E-01	-2.9532999E-01	-2.0616701E+00#	1773	0	0
1774	8.0076998E-01	-4.6302000E-01	-2.0616701E+00#	1774	0	0
1775	1.0907900E+00	-6.3069999E-01	-2.0616701E+00#	1775	0	0
1776	1.2576100E+00	-7.2715998E-01	-1.4950000E+00#	1776	0	0
1777	5.1076001E-01	-2.9532999E-01	-1.2650000E+00#	1777	0	0
1778	7.7912998E-01	-4.5050001E-01	-1.2650000E+00#	1778	0	0
1779	1.0475000E+00	-6.0567999E-01	-1.2650000E+00#	1779	0	0
1780	1.2576100E+00	-7.2715998E-01	-1.2650000E+00#	1780	0	0
1781	5.1076001E-01	-2.9532999E-01	-9.4875002E-01#	1781	0	0
1782	7.6485997E-01	-4.4225001E-01	-9.0834999E-01#	1782	0	0
1783	1.0475000E+00	-6.0567999E-01	-9.0833002E-01#	1783	0	0
1784	5.1076001E-01	-2.9532999E-01	-6.3249999E-01#	1784	0	0
1785	7.5057000E-01	-4.3399000E-01	-5.5167001E-01#	1785	0	0
1786	1.0475000E+00	-6.0567999E-01	-5.5167001E-01#	1786	0	0
1787	5.1076001E-01	-2.9532999E-01	-3.1625000E-01#	1787	0	0
1788	7.3628002E-01	-4.2572999E-01	-1.9499999E-01#	1788	0	0
1789	1.0475000E+00	-6.0567999E-01	-1.9499999E-01#	1789	0	0
1790	5.1076001E-01	-2.9532999E-01	0.0000000E+00#	1790	0	0
1791	7.3628002E-01	-4.2572999E-01	0.0000000E+00#	1791	0	0
1792	5.4062998E-01	-2.3626000E-01	-5.4150000E+00#	1792	0	0
1793	8.2607001E-01	-3.6098999E-01	-5.4150000E+00#	1793	0	0
1794	5.4062998E-01	-2.3626000E-01	-4.9749999E+00#	1794	0	0
1795	8.2607001E-01	-3.6098999E-01	-5.2249999E+00#	1795	0	0
1796	1.2462000E+00	-5.4459000E-01	-5.2249999E+00#	1796	0	0
1797	5.4062998E-01	-2.3626000E-01	-4.5349998E+00#	1797	0	0
1798	8.4851998E-01	-3.7081000E-01	-4.7016602E+00#	1798	0	0
1799	1.2462000E+00	-5.4459000E-01	-4.7016702E+00#	1799	0	0
1800	5.4062998E-01	-2.3626000E-01	-4.0949998E+00#	1800	0	0
1801	8.7096000E-01	-3.8060999E-01	-4.1783500E+00#	1801	0	0
1802	1.2462000E+00	-5.4459000E-01	-4.1783299E+00#	1802	0	0
1803	5.4062998E-01	-2.3626000E-01	-3.6550000E+00#	1803	0	0
1804	8.9341998E-01	-3.9043000E-01	-3.6550000E+00#	1804	0	0
1805	1.2462000E+00	-5.4459000E-01	-3.6550000E+00#	1805	0	0
1806	1.4638300E+00	-6.3970000E-01	-3.6550000E+00#	1806	0	0
1807	5.4062998E-01	-2.3626000E-01	-2.8583300E+00#	1807	0	0
1808	8.7050998E-01	-3.8040999E-01	-2.8583300E+00#	1808	0	0
1809	1.2003800E+00	-5.2456999E-01	-2.8583300E+00#	1809	0	0
1810	1.3975000E+00	-6.1071002E-01	-2.5750401E+00#	1810	0	0
1811	5.4062998E-01	-2.3626000E-01	-2.0616701E+00#	1811	0	0
1812	8.4759998E-01	-3.7040001E-01	-2.0616701E+00#	1812	0	0
1813	1.1545700E+00	-5.0454998E-01	-2.0616701E+00#	1813	0	0
1814	1.3311400E+00	-5.8170998E-01	-1.4950000E+00#	1814	0	0
1815	5.4062998E-01	-2.3626000E-01	-1.2650000E+00#	1815	0	0
1816	8.2468998E-01	-3.6039001E-01	-1.2650000E+00#	1816	0	0
1817	1.1087500E+00	-4.8453000E-01	-1.2650000E+00#	1817	0	0
1818	1.3311400E+00	-5.8170998E-01	-1.2650000E+00#	1818	0	0
1819	5.4062998E-01	-2.3626000E-01	-9.4875002E-01#	1819	0	0
1820	8.0958003E-01	-3.5378999E-01	-9.0834999E-01#	1820	0	0
1821	1.1087500E+00	-4.8453000E-01	-9.0833002E-01#	1821	0	0
1822	5.4062998E-01	-2.3626000E-01	-6.3249999E-01#	1822	0	0
1823	7.9446000E-01	-3.4718001E-01	-5.5167001E-01#	1823	0	0
1824	1.1087500E+00	-4.8453000E-01	-5.5167001E-01#	1824	0	0
1825	5.4062998E-01	-2.3626000E-01	-3.1625000E-01#	1825	0	0
1826	7.7933002E-01	-3.4057000E-01	-1.9499999E-01#	1826	0	0

1827	1.1087500E+00	-4.8453000E-01	-1.9499999E-01#	1827	0	0
1828	5.4062998E-01	-2.3626000E-01	0.0000000E+00#	1828	0	0
1829	7.7933002E-01	-3.4057000E-01	0.0000000E+00#	1829	0	0
1830	5.6369001E-01	-1.7421000E-01	-5.4150000E+00#	1830	0	0
1831	8.6129999E-01	-2.6618999E-01	-5.4150000E+00#	1831	0	0
1832	5.6369001E-01	-1.7421000E-01	-4.9749999E+00#	1832	0	0
1833	8.6129999E-01	-2.6618999E-01	-5.2249999E+00#	1833	0	0
1834	1.2993600E+00	-4.0156999E-01	-5.2249999E+00#	1834	0	0
1835	5.6369001E-01	-1.7421000E-01	-4.5349998E+00#	1835	0	0
1836	8.8472003E-01	-2.7342001E-01	-4.7016602E+00#	1836	0	0
1837	1.2993600E+00	-4.0156999E-01	-4.7016702E+00#	1837	0	0
1838	5.6369001E-01	-1.7421000E-01	-4.0949998E+00#	1838	0	0
1839	9.0811002E-01	-2.8066000E-01	-4.1783500E+00#	1839	0	0
1840	1.2993600E+00	-4.0156999E-01	-4.1783299E+00#	1840	0	0
1841	5.6369001E-01	-1.7421000E-01	-3.6550000E+00#	1841	0	0
1842	9.3153000E-01	-2.8788999E-01	-3.6550000E+00#	1842	0	0
1843	1.2993600E+00	-4.0156999E-01	-3.6550000E+00#	1843	0	0
1844	1.5262700E+00	-4.7170001E-01	-3.6550000E+00#	1844	0	0
1845	5.6369001E-01	-1.7421000E-01	-2.8583300E+00#	1845	0	0
1846	9.0763998E-01	-2.8051001E-01	-2.8583300E+00#	1846	0	0
1847	1.2515900E+00	-3.8681000E-01	-2.8583300E+00#	1847	0	0
1848	1.4571100E+00	-4.5032999E-01	-2.5750401E+00#	1848	0	0
1849	5.6369001E-01	-1.7421000E-01	-2.0616701E+00#	1849	0	0
1850	8.8375998E-01	-2.7313000E-01	-2.0616701E+00#	1850	0	0
1851	1.2038200E+00	-3.7204999E-01	-2.0616701E+00#	1851	0	0
1852	1.3879300E+00	-4.2894000E-01	-1.4950000E+00#	1852	0	0
1853	5.6369001E-01	-1.7421000E-01	-1.2650000E+00#	1853	0	0
1854	8.5987002E-01	-2.6574999E-01	-1.2650000E+00#	1854	0	0
1855	1.1560500E+00	-3.5727999E-01	-1.2650000E+00#	1855	0	0
1856	1.3879300E+00	-4.2894000E-01	-1.2650000E+00#	1856	0	0
1857	5.6369001E-01	-1.7421000E-01	-9.4875002E-01#	1857	0	0
1858	8.4412003E-01	-2.6087999E-01	-9.0834999E-01#	1858	0	0
1859	1.1560500E+00	-3.5727999E-01	-9.0833002E-01#	1859	0	0
1860	5.6369001E-01	-1.7421000E-01	-6.3249999E-01#	1860	0	0
1861	8.2833999E-01	-2.5600001E-01	-5.5167001E-01#	1861	0	0
1862	1.1560500E+00	-3.5727999E-01	-5.5167001E-01#	1862	0	0
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1864	8.1257999E-01	-2.5113001E-01	-1.9499999E-01#	1864	0	0
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1866	5.6369001E-01	-1.7421000E-01	0.0000000E+00#	1866	0	0
1867	8.1257999E-01	-2.5113001E-01	0.0000000E+00#	1867	0	0
1868	5.7898998E-01	-1.1346000E-01	-5.4150000E+00#	1868	0	0
1869	8.8467002E-01	-1.7336001E-01	-5.4150000E+00#	1869	0	0
1870	5.7898998E-01	-1.1346000E-01	-4.9749999E+00#	1870	0	0
1871	8.8467002E-01	-1.7336001E-01	-5.2249999E+00#	1871	0	0
1872	1.3346200E+00	-2.6153001E-01	-5.2249999E+00#	1872	0	0
1873	5.7898998E-01	-1.1346000E-01	-4.5349998E+00#	1873	0	0
1874	9.0872002E-01	-1.7806999E-01	-4.7016602E+00#	1874	0	0
1875	1.3346200E+00	-2.6153001E-01	-4.7016702E+00#	1875	0	0
1876	5.7898998E-01	-1.1346000E-01	-4.0949998E+00#	1876	0	0
1877	9.3274999E-01	-1.8278000E-01	-4.1783500E+00#	1877	0	0
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1879	5.7898998E-01	-1.1346000E-01	-3.6550000E+00#	1879	0	0
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1881	1.3346200E+00	-2.6153001E-01	-3.6550000E+00#	1881	0	0
1882	1.5676800E+00	-3.0720001E-01	-3.6550000E+00#	1882	0	0

1883	5.7898998E-01	-1.1346000E-01	-2.8583300E+00#	1883	0	0
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1890	1.4255900E+00	-2.7935001E-01	-1.4950000E+00#	1890	0	0
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1894	1.4255900E+00	-2.7935001E-01	-1.2650000E+00#	1894	0	0
1895	5.7898998E-01	-1.1346000E-01	-9.4875002E-01#	1895	0	0
1896	8.6702001E-01	-1.6990000E-01	-9.0834999E-01#	1896	0	0
1897	1.1874200E+00	-2.3267999E-01	-9.0833002E-01#	1897	0	0
1898	5.7898998E-01	-1.1346000E-01	-6.3249999E-01#	1898	0	0
1899	8.5082000E-01	-1.6672000E-01	-5.5167001E-01#	1899	0	0
1900	1.1874200E+00	-2.3267999E-01	-5.5167001E-01#	1900	0	0
1901	5.7898998E-01	-1.1346000E-01	-3.1625000E-01#	1901	0	0
1902	8.3463001E-01	-1.6355000E-01	-1.9499999E-01#	1902	0	0
1903	1.1874200E+00	-2.3267999E-01	-1.9499999E-01#	1903	0	0
1904	5.7898998E-01	-1.1346000E-01	0.0000000E+00#	1904	0	0
1905	8.3463001E-01	-1.6355000E-01	0.0000000E+00#	1905	0	0
1906	5.8775002E-01	-5.1419999E-02	-5.4150000E+00#	1906	0	0
1907	8.9806998E-01	-7.8570001E-02	-5.4150000E+00#	1907	0	0
1908	5.8775002E-01	-5.1419999E-02	-4.9749999E+00#	1908	0	0
1909	8.9806998E-01	-7.8570001E-02	-5.2249999E+00#	1909	0	0
1910	1.3548200E+00	-1.1853000E-01	-5.2249999E+00#	1910	0	0
1911	5.8775002E-01	-5.1419999E-02	-4.5349998E+00#	1911	0	0
1912	9.2247999E-01	-8.0710001E-02	-4.7016602E+00#	1912	0	0
1913	1.3548200E+00	-1.1853000E-01	-4.7016702E+00#	1913	0	0
1914	5.8775002E-01	-5.1419999E-02	-4.0949998E+00#	1914	0	0
1915	9.4687998E-01	-8.2840003E-02	-4.1783500E+00#	1915	0	0
1916	1.3548200E+00	-1.1853000E-01	-4.1783299E+00#	1916	0	0
1917	5.8775002E-01	-5.1419999E-02	-3.6550000E+00#	1917	0	0
1918	9.7128999E-01	-8.4980004E-02	-3.6550000E+00#	1918	0	0
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1920	1.5914201E+00	-1.3923000E-01	-3.6550000E+00#	1920	0	0
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1925	5.8775002E-01	-5.1419999E-02	-2.0616701E+00#	1925	0	0
1926	9.2148000E-01	-8.0619998E-02	-2.0616701E+00#	1926	0	0
1927	1.2552100E+00	-1.0982000E-01	-2.0616701E+00#	1927	0	0
1928	1.4471700E+00	-1.2661000E-01	-1.4950000E+00#	1928	0	0
1929	5.8775002E-01	-5.1419999E-02	-1.2650000E+00#	1929	0	0
1930	8.9657998E-01	-7.8440003E-02	-1.2650000E+00#	1930	0	0
1931	1.2054000E+00	-1.0546000E-01	-1.2650000E+00#	1931	0	0
1932	1.4471700E+00	-1.2661000E-01	-1.2650000E+00#	1932	0	0
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1934	8.8015002E-01	-7.7000000E-02	-9.0834999E-01#	1934	0	0
1935	1.2054000E+00	-1.0546000E-01	-9.0833002E-01#	1935	0	0
1936	5.8775002E-01	-5.1419999E-02	-6.3249999E-01#	1936	0	0
1937	8.6369997E-01	-7.5560004E-02	-5.5167001E-01#	1937	0	0
1938	1.2054000E+00	-1.0546000E-01	-5.5167001E-01#	1938	0	0

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 1940  8.4726000E-01 -7.4129999E-02 -1.9499999E-01#   1940   0   0
 1941  1.2054000E+00 -1.0546000E-01 -1.9499999E-01#   1941   0   0
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 1947  9.0149999E-01  0.0000000E+00 -5.2249999E+00#   1947   0   0
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 1970  1.4527000E+00  0.0000000E+00 -1.2650000E+00#   1970   0   0
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 1975  8.6699998E-01  0.0000000E+00 -5.5167001E-01#   1975   0   0
 1976  1.2100000E+00  0.0000000E+00 -5.5167001E-01#   1976   0   0
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 1978  8.5049999E-01  0.0000000E+00 -1.9499999E-01#   1978   0   0
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 1981  8.5049999E-01  0.0000000E+00  0.0000000E+00#   1981   0   0
# STB L03R00U00
#           0         1       110         7
#     1  SOLID PROPERTIES
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0.000000e+00
#  0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
0.000000e+00
#  0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
#           1         1         1        20
# ISO MAT    1
#  1.550000e+07 1.550000e+07 0.000000e+00 5.000000e-01 0.000000e+00
0.000000e+00
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#  0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
0.000000e+00
#  0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
0.000000e+00
#  0.000000e+00 0.000000e+00
#
MMATC
 1 1.55000000E+07 1.55000000E+07 0.00000000E+00 0.00000000E+00
#
#  The following is for solid elements.
#
*XQT AUS
!! E=1.55E+7: !NU=.25: !A11=1./E: !A21=-NU/E: !A44=1.+NU*2./E
TABLE(NI=31, NJ=1): PROP BTAB 2 21
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I=  3  5  6: J=1: "A21" "A21" "A21"
I= 11 16 22: J=1: "A44" "A44" "A44"
*XQT ELD
S61
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# NMAT =     1
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       144     147     207     143     146     206
       305     308     368     304     307     367
       306     309     369     305     308     368
       449     452     512     448     451     511
       450     453     513     449     452     512
       867     870     941     866     869     940
       868     871     942     867     870     941
      1051    1054    1125    1050    1053    1124
      1052    1055    1126    1051    1054    1125
      1217    1220    1291    1216    1219    1290
      1218    1221    1292    1217    1220    1291
      1520    1521    1527     144     147     207
       866     869     940    1520    1521    1527
      1539    1540    1552     306     309     369
      1050    1053    1124    1539    1540    1552
      1558    1559    1565     450     453     513
      1216    1219    1290    1558    1559    1565
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         5       8       9       6      68      71      72      69
         7      10      11       8      70      73      74      71
         8      11      12       9      71      74      75      72
        10      13      14      11      73      76      77      74
        11      14      15      12      74      77      78      75
        13      16      17      14      76      79      80      77
        14      17      18      15      77      80      81      78
        16      19      20      17      79      82      83      80
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1908	1911	1912	1909	1946	1949	1950	1947
1909	1912	1913	1910	1947	1950	1951	1948
1911	1914	1915	1912	1949	1952	1953	1950
1912	1915	1916	1913	1950	1953	1954	1951
1914	1917	1918	1915	1952	1955	1956	1953
1915	1918	1919	1916	1953	1956	1957	1954

```
      1917    1921    1922    1918    1955    1959    1960    1956
      1918    1922    1923    1919    1956    1960    1961    1957
      1919    1923    1924    1920    1957    1961    1962    1958
      1920    1924     637     636    1958    1962     700     699
      1921    1925    1926    1922    1959    1963    1964    1960
      1922    1926    1927    1923    1960    1964    1965    1961
      1923    1927    1928    1924    1961    1965    1966    1962
      1924    1928     638     637    1962    1966     701     700
      1925    1929    1930    1926    1963    1967    1968    1964
      1926    1930    1931    1927    1964    1968    1969    1965
      1927    1931    1932    1928    1965    1969    1970    1966
      1929    1933    1934    1930    1967    1971    1972    1968
      1930    1934    1935    1931    1968    1972    1973    1969
      1933    1936    1937    1934    1971    1974    1975    1972
      1934    1937    1938    1935    1972    1975    1976    1973
      1936    1939    1940    1937    1974    1977    1978    1975
      1937    1940    1941    1938    1975    1978    1979    1976
      1939    1942    1943    1940    1977    1980    1981    1978
*XQT SEQ
*XQT TAN
*XQT E
RESET G=386.
T = .1-19 -.1-2 .1-4 .1+1 .4+1 .1-3 .1-3 .1-3
*XQT EKS
*XQT K
*XQT EXIT
$ DEASSIGN FOR006
```

APPENDIX B

DALPRO RUNSTREAM - UNIVERSAL FILE TO EAL MODEL CONVERSION

```
SYMEND &NU 'RUN ','UNVE'      0     0 XSPN
*=DECK UNVE RUN STREAM
*=KEYS UNIVERSAL IDEAS EAL
*=DESC UNVE (RUN)  Create an IDEAS universal file from an EAL model
*
*   UNVE   nunit
*
*   Creat a SuperTab universal file from an EAL model
*
*   nunit is the output FORTRAN unit and defaults to 3
*
SET nout=3,isk=0
recover nout,isk
*
##jgtz &isk skip
cycset k1:k4
*
CYCLE 0,0
*
##SET NJTS=1,JLOC,BTAB,2,5  6
##jeqz &njts exit
##calc  ntot = njts*3
*
ECOL 28,SEQ,JTS &NJTS,1
  1/&NJTS
BUILD  28,JLOC,DEF  &NJTS,7
  MIX  28,SEQ,JTS
  FILL  1,&NJTS  4,4
   7
  ##CYCLE 2,5
  IAFJ  1,0
  MIX  1,JLOC,BTAB  1,&ntot 1,3  1,5  3,0  1,1
  ##CYCLE 0,0
  DONE
*
  write 6  &njts
   (/'   Writing joint locations (',i5,') '/)
*
*  Write the joint location dataset to file
*
  WRITE -&nout  -1,15
   (I6)
  PRINF  28,JLOC,DEF  -&nout
   (4I10,1P3E13.5)
  WRITE -&nout  -1
   (I6)
*
*  Build data constants, first the element names
*
 ECOL  28,TYPE,NAMS  18,1
   E21,E22,E23,E24,E25,E31,E32,E33,E41,E42,E43,E44,
   S41,S61,S81,F41,F61,F81
*
*  Next the cross reference to Supertab types and element numbers
*
 ECOL  28,TYPE,XREF  18,2
     1,  1,  1,  1,  1,  2,  2,  2,  5,  5,  5,  5,
    14, 16, 19, 14, 16, 19
    21, 21, 21, 21, 21, 91, 91, 91, 94, 94, 94, 94,
   111,112,115,111,112,115
```

```
*
*  And lastly, a MATC pointer. For EAL solids, the mass properties
*  go along with the NSECT pointer, and the normal MATC slot isn't used
*
 ECOL   28,MATC,XREF  18,1
    12*4,6*5
*
*  You can modify how a given type of EAL element is stored by creating
*  a chop vector here.
*
*   ecol   28,cvec,e21 2,1
*     1,2
*
*  Locate all DEF datasets
*
 >>SKIP
 FINES  1,DEF,MASK
   28,ALL,DEF
   ##SET NDEF=28,ALL,DEF,-7
   ##JEQZ &NDEF EXIT
   TRAN  28,ALL,DEF  28,DEF,NAMS  11,11  1,&NDEF
   INDEX 28,DEF,NAMS 28,TYPE,NAMS  28,DEF,TYPS 0
    ##JEQZ &N$ OKAY
      WRITE 6
     (/'   This model has a dataset type not found in the following list:'/)
      PRICF 28,TYPE,NAMS
      (1X,15A5)
      ##JUMP EXIT
  >>OKAY
*
##SET NGRP = 1,GD,MASK,MASK,MASK,6
*
SET I=0,NELT=0
>>TOP
  ##INC I,1
  ##SET NAM=28,ALL,DEF,11,&I
  ##SET NNPE=28,ALL,DEF,13,&I
  ##SET ILT =28,ALL,DEF,7,&I
  ##SET ITYP=28,ALL,DEF,12,&I
  CALC
     NI = (28,ALL,DEF,8,&I)/ILT
     ILT = (28,ALL,DEF,6,&I)/NI
     NELT = NELT + ILT
     NC = 5 + NNPE
     DONE
  CYCLE  &ITYP,&NNPE  0,0
  EXPAND  1,DEF,&NAM   28,TMP,EXP  &NI,1
  CYCLE 0,0
  TRAN  28,TMP,EXP  28,CONN,&NAM  &NC,&ILT
    2,5,6,7,8,13/&NNPE
    1/&ILT
  ##GGTV &NDEF,&I  TOP
*
 ECOL  28,ELT,LIST  &NELT,1
   1/&NELT
 SET I=0, LAST=0
*
>>skip
  write 6  &ngrp,&nelt
   (/'   Writing element information,',i4,' groups,',i6,' elements.'/)
```

```
  WRITE -&nout  -1,71
   (I6)
*
 >>TOP2
  ##INC I,1
  ##SET NAM=28,ALL,DEF,11,&I
  ##SET NNPE=28,ALL,DEF,13,&I
  ##SET ILT =28,CONN,&NAM,7
  ##set ixrf=28,def,typs,&i,1
  ##SET KTYP =  28,TYPE,XREF  &ixrf,1
  ##SET KFED =  28,TYPE,XREF  &ixrf,2
  ##SET MATC =  28,MATC,XREF  &ixrf,1
  ##calc isiz = nnpe+7
    write 6 &ilt,&nam,&nnpe
     (10x,i6,1x,a4,' elements,',i3,' nodes/elt')
*
  CALC
   NEXT = LAST + 1
   LAST = LAST + ILT
   NC   = NNPE + 5
   DONE
*
  BUILD  28,def,&nam &ILT,&ISIZ 0
    MIX  28,ELT,LIST  &NEXT,&LAST  1,1  1,1
    FILL  1,&ILT  2,2
       &KTYP
    FILL  1,&ILT  3,3
       &KFED
*
* phys  =  100*(c2 from BTAB) + NSECT (eg. BA = 9xx, BC = 11xx, SA = 13xx)
*
    ADDX  28,conn,&nam  1,&ilt  3,3  1,4
       100
    PLUS  28,conn,&nam  1,&ilt  5,5  1,4
*
* matc -- for most elements this is MATC, but for solids, it's NSECT
*
    mix   28,conn,&nam  1,&ilt  &matc,&matc  1,5
*
* color  -- this color scheme is based on the group number, mod 14
*
    mix   28,conn,&nam  1,&ilt  1,1  1,6
    addc  1,&ilt  6,6
       -1
    divc  1,&ilt  6,6
       14
    mulc  1,&ilt  6,6
      -14
    plus  28,conn,&nam  1,&ilt  1,1  1,6
    addc  1,&ilt  6,6
        1
* # nodes/elt
    FILL  1,&ILT  7,7
       &NNPE
* connectivity
    MIX  28,conn,&nam 1,&ILT  6,&NC  1,8
    DONE
  PRINF  28,def,&nam  -&nout
    (7I10/(8I10))
*
```

```
  ##GGTV &Ndef,&I  TOP2
  WRITE -&nout  -1
    (I6)
*
>>exit
  cycle &k1,&k2  &k3,&k4
run- UNVE
XSPN
```

```
SYMEND &NU 'RUN ','UTOE'      0      0 XSPN
*
*  Read a Universal File
*
*   (Caution: this runstream will only work with Dalpro version 8.3 and up)
*
*  The input universal file must be named  xxxxxxxx.UNV  where the filename
*  part may be up to 8 characters long.
*
default isk$=0
default name=0,nout=2
recover  name,nout
##read through
*
*  preliminary data
*
  ecol 28,kt,list  10,2
    21,  74,  61,  91,  71,  64,  94, 111, 112, 115
   E21, E31, E32, E33, E41, E42, E43, S41, S61, S81
*
  ecol  28,legl,etyp  17,1
   e21:e24  e31:e33 e41:e44  s41,s61,s81  f41,f61,f81
*
  set jst=1
*
*  get the name of the universal file
*
##jnez &isk$ skip
  write 6
   (/' The name of the universal file must be of the form xxxxxxxx.UNV'/
     ' and the file must be in the current default directory.'/)
  recipe
   Enter the xxxxxxxx part of the name >
     ##read 0,auto
  set ilt=' ',ivr=' '
  receive  ilt,ivr
    '"REC$"
*
  set nren=0
  ##ask nope 0  Do you want the nodes renumbered (c/r = no) ?
    set nren=1
  >>nope
*
*  read it
*
  set nlin = 0, joe$ = oops
*
  write 6
    $$(/'  Begin read of &ilt(a4)&ivr(a4).UNV '/)
  csym  unv,&ilt,&ivr  28
  change 28,&ilt,&ivr  inp,unv
  varr joe$
  ##jnez &name skip
    set name=&ilt
  ##jump skip
 >>oops
  write 6
   $$(' The file &ilt(a4)&ivr(a4).UNV could not be opened.'/)
  ##jump exit
 >>skip
```

```
  calc
    ityp = (28,inp,unv,8) <abs>
    nlin = (28,inp,unv,6)
    ##jeqv &ityp,5 okay
      nlin = (28,inp,unv,5)/20
      >>okay
    done
*
  write 6 &nlin
   (' Your input file has',i6,' lines.'/)
  ##jeqz &nlin exit
*
*  find the number of datasets by looking for -1
*
##jgtv &isk$,1 skip
  cserch  28,inp,unv  28,file,brks  start
    -1
>>skip
  ##calc  nfil = (28,file,brks,5)/2
  ##jgtz &nfil okay
    write 6
     ('  The file contains no universal datasets. '/)
    ##jump exit
  >>okay
*
*  for each dataset get starting location and number of cards
*
  build  28,set,info  &nfil,2  0
    mix   28,file,brks  1,&mch$  1,1  1,1  2,1  1,1
    addc   1,&nfil  1,1
      1
    mix   28,file,brks  2,&mch$  1,1  1,2  2,1  1,1
    minus 28,file,brks  1,&mch$  1,1  1,2  2,1  1,1
    addc  1,&nfil  2,2
     -2
    done
*
*  extract the dataset type
*
##jgtv &isk$,2 skip
  chops  28,inp,unv  28,loc,sym  &nfil
     = 28,set,info 1
>>skip
  gread  28,set,typ  &nfil,1
    80
     ##read  28,loc,sym
  write 6 &nfil
   (' It contains the following',i3,' dataset types: '/)
  pricf  28,set,typ
    (10i6)
*
*  update the starting location to point to the card after the dataset type
*
  buildx  28,set,info  &nfil,2
    addc  1,&nfil 1,1
      1
    done
*
*  At this point, we know
*
```

```
*     1) the number of Universal File Datasets that are present,
*     2) the type of each dataset
*     3) the starting card number
*     4) the number of cards
*
*  Compare the dataset type with the type of datasets we support
*
  set  nlt=5,nltp=6
  ecol  28,unv,ltyp  &nlt,1
*
        151,  156,  15,  91,  71
*
  ecol  28,unv,labl  &nltp,1
*
        head,unit,jloc,prop,elts,othr
*
  index  28,set,typ  28,unv,ltyp 28,typ,indx  &nltp
  chopx  28,unv,labl 28,set,sub  28,typ,indx -1
*
  order  28,typ,indx 28,tmp,tord 1  28,type,ordr
*
*  Start writing the output EAL file
*
  receive
$$  &NAME(A4)
  write 6
    (/' The EAL geometry deck will be written to "REC$".GEO '/)
  ##open  &nout  '"REC$".GEO
  write -&nout
    $$(1h','&name(a4).'/'*ONLINE=0'/14H*CHAR '$*!"':>)
*
  set jfil=0
>>nxtf
  calc
    jfil = jfil + 1
    ifil = (28,type,ordr,&jfil,1)
    ityp = (28,set,typ,&ifil,1)
    joff = (28,set,info,&ifil,1)
    ncrd = (28,set,info,&ifil,2)
    isub = (28,set,sub,&ifil,1)
    done
*
    write 6 &ityp,&ncrd
   (/' Processing dataset type ',i3,' (',i6,' cards)'/)
*
##jnev  othr,&isub  chop
*
*  unsupported type
*
    write 6 &ityp
      ('   Universal dataset type ',i4,' is not supported.'/
       '   I can write the card images to your output file as '/
       '   comment cards or I can skip the dataset.'/)
  ##ask cont 0   Shall I make comments out of these cards ?
    write -&nout &ityp
      (1h$/'$  Cards from Universal dataset type ',i5/' $')
*
>>chop
*
  chops  28,inp,unv  28,cur,s&ityp  &ncrd
```

```
    &joff/&ncrd
*
*  Branch to proper subroutine
*
  ##jump &isub
  >>othr
  >>head
  >>unit
    prinf  28,cur,s&ityp  -&nout
      (2h$ ,19a4,a2)
    write -&nout
      ('$')
    write 6 &ncrd
      (i6,' comment cards written.'/)
    ##jump cont
  >>prop
*
*  Material and physical properties
*
*  First, echo all of the cards as comments in the output deck
*
    prinf  28,cur,s&ityp  -&nout
      (2h$ ,19a4,a2)
    write -&nout
      ('$')
    write 6 &ncrd
      (i6,' property cards were written as comments.'/)
*
*  Search for records that start with a 1 so that at least any isotropic
*  material will be processed.
*
*  (the spacing for the '1' following cserch is critical)
*
    cserch 28,cur,s&ityp  28,iso,locs start
         1
    ##set nmat=&mch$
    ##jeqz &nmat cont
*
    chops  28,cur,s&ityp 28,mh,exp  &mch$ -40
      = 28,iso,locs
    gread   28,mat,head  &mch$,-4
      80
      ##read 28,mh,exp
*
    buildx  28,iso,locs &mch$,1
      addc
        2
      done
    chops  28,cur,s&ityp 28,md,exp  &mch$
      = 28,iso,locs
    greadc  28,mat,data  &mch$,-6
      6*13
      ##read 28,md,exp
    chopx  28,mat,data  28,mat,data  -&mch$,5
      0,1,2,3,5
    modify  28,mat,data  -&mch$
      1/&mch$
      &mch$*1
      = 28,mat,head,2
*
```

```
    write -&nout
      ('MATC')
    prinf  28,mat,data  -&nout
      (i3,1p4e15.8)
    ##jump cont
  >>jloc
*
*   Read node information, then order by coord system and node labels
*
    gread  28,node,info  &ncrd,-7
      4*10,3*13
      ##read 28,cur,s&ityp
    order  28,node,info  28,node,info  -3
      2,3,1
    ordnt  28,node,info  28,uniq,sys 2
    calc
      isys = (28,uniq,sys,1,2)
      nsys = (28,uniq,sys,-6)
      ifmt = isys + 1
      done
    write 6 &nsys,&ifmt
      ('  Your model has ',i2,' coordinate system(s). The JLOC deck '/
       '  will be written with a single FORMAT=',I2,' card.')
*
   chopx  28,node,info  28,jnt,list  -&ncrd,-1
   ##jeqz &nren skip
     ecol  28,jnt,list  &ncrd,1
       1/&ncrd
     chopx  28,node,info  28,node,lbls  -&ncrd,-1
   >>skip
     maxmin  28,jnt,list  28,xn,jnt
     ##set mxjt = 28,xn,jnt,1,1
*
*   The JLOC cards will be written as
*
*   #  x  y  z  $  label  sys1 sys2
*
   build  28,node,list  &ncrd,7
     mix  28,jnt,list
     mix  28,node,info  1,&ncrd  5,7  1,2
     mix  28,node,info  1,&ncrd  1,3  1,5
     done
*
   write -&nout &mxjt  &ifmt
    ('*XQT TAB'/' START ',I6/' JLOC'/' FORMAT=',I1)
*
   prinf  28,node,list  -&nout
    (i6,1p3e15.7,'$ ',i6,2i4)
*
*  save the jloc labels and the locations
*
    chopx  28,node,info  1,jlbl,&name  -&ncrd,-1
    chopx  28,node,info  1,jloc,&name  -&ncrd,3
      5,6,7
    changt  1,jloc,&name  1
    ##jump cont
  >>elts
*
*  blind read the element info as an N by 8 matrix
*
```

```
    greadc  28,raw,elt  &ncrd  -8  0
        8*10
      ##read  28,cur,s&ityp
*
*  The raw element dataset consists of at least two records per element
*  The first record contains
*     Elt #, GraphId, DescID, PhysId, MatID, Kolor, # nodes/elt
*  the next record(s) contain the node numbers associated with this
*  element, in (8I10) format. Thus the number of cards needed for the nodes
*  of a given element is (NNPE-1)/8 + 1
*
*  The X option of CCNTS provides a means for identifying which cards go
*  with each element. First, chop out the NNPE column and compute the number
*  of nodal cards per element.
*
   build   28,crd,cnt &ncrd,1  0
     mix  28,raw,elt  1,&ncrd  7,7
     addc
        -1
     divc
         8
     addc
         1
     done
   ccntx  28,crd,cnt  28,crd,pntr
*
*   The first column contains the element sequence number (eg 1,1,2,2,3,3,...)
*   and the second column contains the relative card count for each element
*   (eg 0,1,0,1,0,1,...) So, look for all zeros in column 2 and use this
*   list to select out the element information
*
   search  28,crd,pntr  28,edef,locs  2  0,0
*
*  At this point, assume that  28,edef,locs  points to all of the
*  element definition sections. (and mch$ contains the number of those)
*
   set nelt = &mch$
   chopx  28,raw,elt  28,elt,def  28,edef,locs  -7
*
*  The basic element type is given by the descriptive id, which is column 3
*
   chop  28,elt,def  28,desc,id  -&nelt,1
     3
   ordnt  28,desc,id  28,did,etyp  1
   ##set ntyp = 28,did,etyp,-6
   index   28,desc,id  28,did,etyp  28,etyp,pntr  0
*
*  Cross reference each input type to an EAL type
*
   >>again
   ##set nkt = 28,kt,list,-6
   index  28,did,etyp  28,kt,list  28,eal,type
   ##jeqz &n$  adef
*
*  oops, one or more of the DescId's weren't expected. Allow the user to
*  fill in the blanks
*
     search  28,eal,type   28,bad,typs  1  0,0
     index   28,bad,typs   28,etyp,pntr  28,bad,xmpl
     chop    28,elt,def    28,bad,elts   &mch$,3
```

```
          = 28,bad,xmpl
            2,3,7
        write 6 &mch$
          (/' The following input element types need a corresponding EAL'/
            ' element type: '/'   GID   PID   #nodes/elt'/)
        prinf  28,bad,elts
          (2i6,i10)
        write 6
           (1x)
        ##ask exit 0  Are you ready to supply them ?
          write 6
           (' Enter, in the above order, the EAL types that should be used:'/)
          gread  28,new,etyp  &mch$,1
              80
              ##read 0,auto
          ##set new=28,new,etyp,-6
          ##jnev &new,&mch$ btyp
            index  28,new,etyp  28,legl,etyp  28,chk,it  0
            ##jeqz &n$ okay
              >>btyp
                write 6
                 ('  Something is wrong with the EAL types that you entered.'/)
                 ##jump exit
            >>okay
              ##calc ntot = nkt + new
              ecol  28,new,kt  &ntot,2
                = 28,kt,list,1
                = 28,bad,elts,2
                = 28,kt,list,2
                = 28,new,etyp,1
*
*  now, loop through again to make sure that all types are accounted for
*
               change 28,new,kt  28,kt,list
               ##gump agin
*
*  At this point, all input types have been cross-referenced to EAL types.
*  Now each type has to be separated into groups, and the actual joint
*  connections have to be specified.
*
    >>adef
*
*  Write introductory information, then loop on types
*  (Note, if there are any solids, then a special property table must
*   be build in AUS. The general form is added whether or not solids are
*   present)
    write -&nout
     ('$'/'$  The following is for solid elements.'/'$')
    write -&nout
     ('*XQT AUS'/
      '! E=1.55E+7: !NU=.25: !A11=1./E: !A21=-NU/E: !A44=1.+NU*2./E'/
      ' TABLE(NI=31, NJ=1): PROP BTAB 2 21')
    write -&nout
     (' I=  2  4  7: J=1: "A11" "A11" "A11"'/
      ' I=  3  5  6: J=1: "A21" "A21" "A21"'/
      ' I= 11 16 22: J=1: "A44" "A44" "A44"')
    write -&nout
     ('*XQT ELD')
*
symend  28,utoe,loop  utlp
```

```
  set ityp=0
>>nxtp
*
*  Increment the type counter, get the EAL element type, and write it
*
  ##inc ityp,1
  ##set neal=28,eal,type,&ityp,1
  write -&nout &neal
   (1x,a4)
*
*  look for all elements of this type
*
    search  28,etyp,pntr  28,this,list  1 1
      &ityp
*
*  extract out all of the node cards
*
   calc
     itot = mch$
     item = (28,this,list,1,1)
     nnpe = (28,elt,def,&item,7)
     ncrd = nnpe - 1 /8 + 2
     icrd = 1
     left = nnpe
     nxt = 1
     done
     search  28,crd,pntr  28,node,pntr  1 &itot
       = 28,this,list
     chopx   28,raw,elt  28,def,nods  28,node,pntr -8
*
     build  28,node,list  &itot,&nnpe  0
     >>nxcd
       ##set num=&left
       ##jlev &num,8 okay
         ##set num=8
       >>okay
       ##inc icrd,1
       mix  28,def,nods  &icrd,&mch$  1,&num  1,&nxt  &ncrd,1
       ##inc nxt,&num
       ##inc left,-&num
       ##ggtz &left,nxcd
       done
*
*  The joint locations must already have been completed in order for the
*  joint label cross referencing to be completed.
*
   ##set ichk=28,node,lbls,-6
   ##jeqz &ichk,skip
   ##jeqz &nren skip
     index  28,node,list  28,node,lbls  28,node,list  0
       ##jeqz &n$ skip
         write 6 -&n
           (/i6,' joint labels are messed up. Bail out.'/)
         ##jump exit
     >>skip
*
*  Construct groups by forcing all elements in a group to have the same
*  PhysID, MatID, and Kolor codes
*
    chopx  28,elt,def  28,pmk,all  &itot,3
```

```
        = 28,this,list
          4,5,6
      ordnt  28,pmk,all  28,pmk,uniq  -3
         1,2,3
      expand   28,pmk,all   28,pmke,all
      expand   28,pmk,uniq  28,pmke,uniq
*
      index    28,pmke,all  28,pmke,uniq  28,grp,pntr
*
      ##set ngrp = 28,pmk,uniq  -6
      ##set igrp=0
    >>nxgp
      ##inc igrp,1
      prinf  28,pmk,uniq &igrp,&igrp -&nout
       $$(' GROUP &igrp(i3)  $  P,M,K = ',3i5)
      ##set ip = 28,pmk,uniq,&igrp,1
      ##set im = 28,pmk,uniq,&igrp,2
      write  -&nout  &ip,&im
         ('$ NSECT = ',I5/'$ NMAT = ',I5)
*
        search  28,grp,pntr  28,cur,elts  1  &igrp,&igrp
        chopx   28,node,list -28,cur,nlst  28,cur,elts,-&nnpe
        prinf   28,cur,nlst  -&nout
          (3x,8i8)
      ##ggtv &ngrp,&igrp nxgp
    ##ggtv &ntyp,&ityp nxtp
utlp
*
*  Add the above do-loop
*
##read 28,utoe,loop
*
  >>cont
    ##ggtv &nfil,&jfil  nxtf
  write -&nout
   ('*XQT EXIT')
>>exit
  run- utoe
>>mask
  write 6
    ('  Yikes, something wierd happened. ')
    ##gump cont
XSPN
```